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The Fireproofing HAND-BOOK

FIFTH EDITION

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The Fireproofing Hand-Book

(*Fifth Edition*)
1916

A Book Dealing with the Problems of Low Cost Fireproof Construction, Using as a Basis the Reinforcing Materials: Self-Sentering, Trussit and Expanded Metal

GF
YOUNGSTOWN, OHIO.

Trade Mark
Reg. U. S. Pat. Off.

THE GENERAL FIREPROOFING CO.
YOUNGSTOWN, OHIO, U. S. A.

Chicago Office
325 West Madison Street

Atlanta Office
Third National Bank Building

Export Office
395 Broadway, New York

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No 1 Central Buildings, Westminster

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The home of a complete line of Fireproofing Building Materials and Waterproofing Products. Self-Sentering, Trussit, Steel-Tile, Expanded Metal, Herringbone Rigid Metal Lath, Diamond-Rib Metal Lath, Genfire Sheet Steel Lath, Cold Rolled Channels, Corner Bead, Crimped Furring and Wall Ties.

Also Waterproofings, Dampproofings, Technical Paints and Interior Decorative Coatings.

A reliable dealer in each representative city carries a stock of GF Products, greatly facilitating delivery to the building operations.

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Fireproof Construction

FIREPROOF construction must be recognized as an economic necessity. Annual fire losses which run into hundreds of millions of dollars confirm this without question. Insurance is but a pretext by which all are required to share the losses of unwise builders.

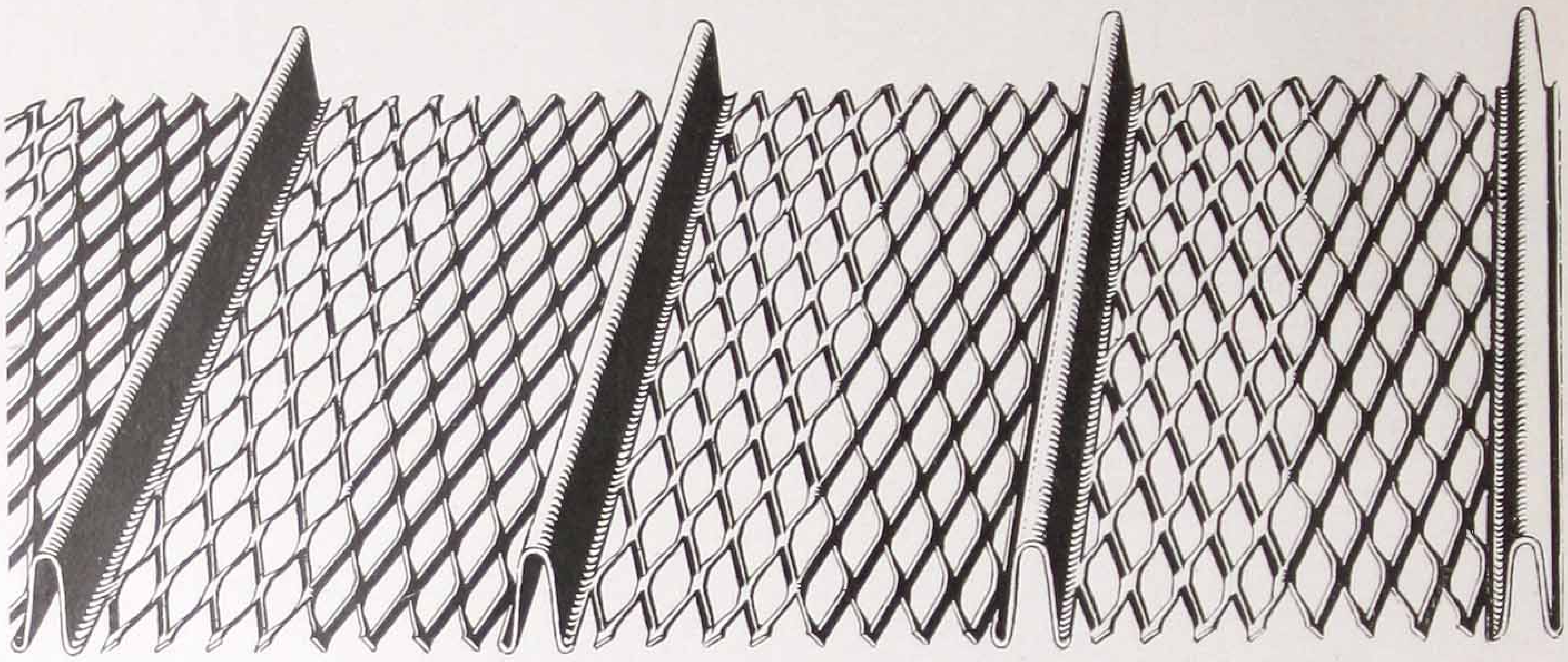
Already the National and State governments have recognized that fire-prevention and conservation of materials are necessary for the future public welfare. State and city building codes reflect this need in their increasing restrictions of burnable construction.

This book is issued yearly, in an effort to assist the architect, engineer and builder with the most modern approved methods of unburnable building. Primarily of course, it is an advertisement, but it is built upon the principle that "service rendered" is the best possible form of advertising.

We have aimed to show every important detail for the various types of construction recommended. Our Engineering Department is at the service of all architects or engineers in working out special details involving the use of our materials. We do not do architectural work for owners but we will assist the architect and engineer, for whom this book is primarily intended, at any and all times.

THE GENERAL FIREPROOFING CO.
Youngstown, Ohio, U. S. A.

Self-Sentering



Patented March 3, 1914—Other patents pending

SELF-SENTERING, as its name implies, is a type of expanded metal for concrete reinforcing and miscellaneous fireproofing, which is, in itself, a combined reinforcing and centering—a one-piece steel lath and stud, or furring.

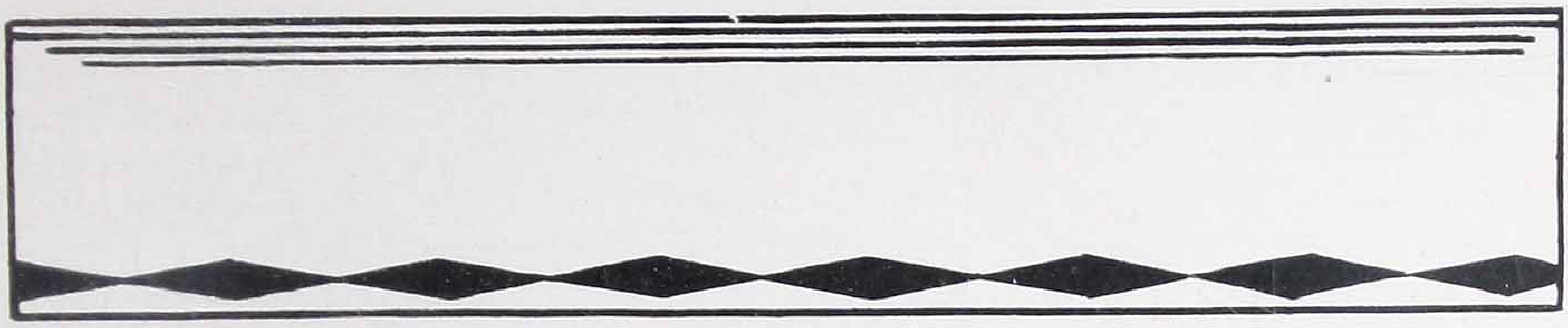
It is made up of a series of heavy, cold-drawn ribs, $\frac{11}{16}$ inch high, always spaced $3\frac{5}{8}$ inches center to center, connected by the most efficient form of expanded metal—the diamond mesh—all cut and drawn from one sheet of steel.

This material has been perfected after years of study and experiment and it has advantages found in no other reinforcing material on the market. Briefly, they are:

Its heavy ribs are cold-drawn, not stamped, increasing their tensile strength from twenty to forty per cent and their elastic limit from sixty to one hundred per cent. They are made with sides parallel, to give them maximum rigidity, and with a beaded edge at the joining of the expanded metal fabric to stiffen them still further.

The connecting fabric is designed on the only true principle of expanded metal reinforcement. The diamond-shaped meshes diffuse strains from concentrated loads, afford effective continuity of the reinforcement, tend to transfer tensile stresses in the steel to compression in the concrete, and insure that every ounce of metal is in tension. Note there are no breaks at right angles to the line of stress and no metal is wasted to act as mere connecting members. This same mesh affords a perfect mechanical bond for concrete. Roughly speaking, Self-Sentering offers a bonding surface eleven times as great as the same effective sectional area in reinforcing bars. This same mesh also affords an unbreakable key for plaster or mortar.

Sheets of Self-Sentering are the widest of any similar material made —29 inches and in stock lengths up to 12 feet. This means that the cost of placing Self-Sentering is reduced to a minimum. Every time a 12-foot sheet is applied, 29 square feet of surface is covered. The number of laps is correspondingly decreased, with still more saving in labor.



Longitudinal Section of Self-Sentering. Actual Size

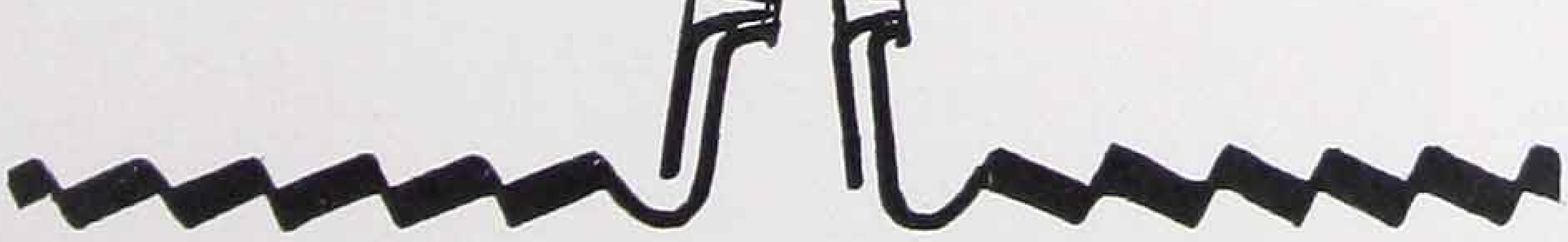
Self-Sentering is made from a special grade of steel manufactured expressly for this purpose and this, together with the peculiar structure of the material, insures it against damage from rough handling in shipment or on the job. While absolutely rigid the long way of the ribs, taken the other way of the sheet Self-Sentering is uniformly pliable. It can be bent and twisted or folded again and again without sign of fracture and returned to its original form as good as new. This characteristic makes it applicable to curved surface work where it is necessary for ribs to run at right angles to the line of curve, without danger from breaking.

Self-Sentering is always furnished with a coating of baked-on enamel to protect it from corrosion until it is placed on the job. The mechanical bond of Self-Sentering is so great that this coating need cause no apprehension.

These points of superiority in the material itself are self-evident and they are found in no other similar product.

Self-Sentering finds use in all classes of buildings; for concrete roofs, floors, side walls, ceilings, partitions, columns and beam protection—in industrial buildings, office buildings, warehouses, silos, tanks, garages—such a multitude of uses that it can be fairly classed as a standard for fireproofing reinforcement.

The methods of using Self-Sentering for these various purposes are briefly outlined on the following pages.



Cross Section of Self-Sentering—Showing Side Lap and Method of Punching. Actual Size

Self-Sentering Data

Size of sheets—29 inches wide by lengths of 4, 5, 6, 7, 8, 9, 10, 11 and 12 feet. Longer lengths up to 14 feet furnished on special order. Intermediate lengths will be cut from the next longer sheet and any waste charged to customer.

Height of ribs, $\frac{11}{16}$ inch.

Spacing of ribs always $3\frac{5}{8}$ inches center to center.

Made regularly in the following gauges and weights:

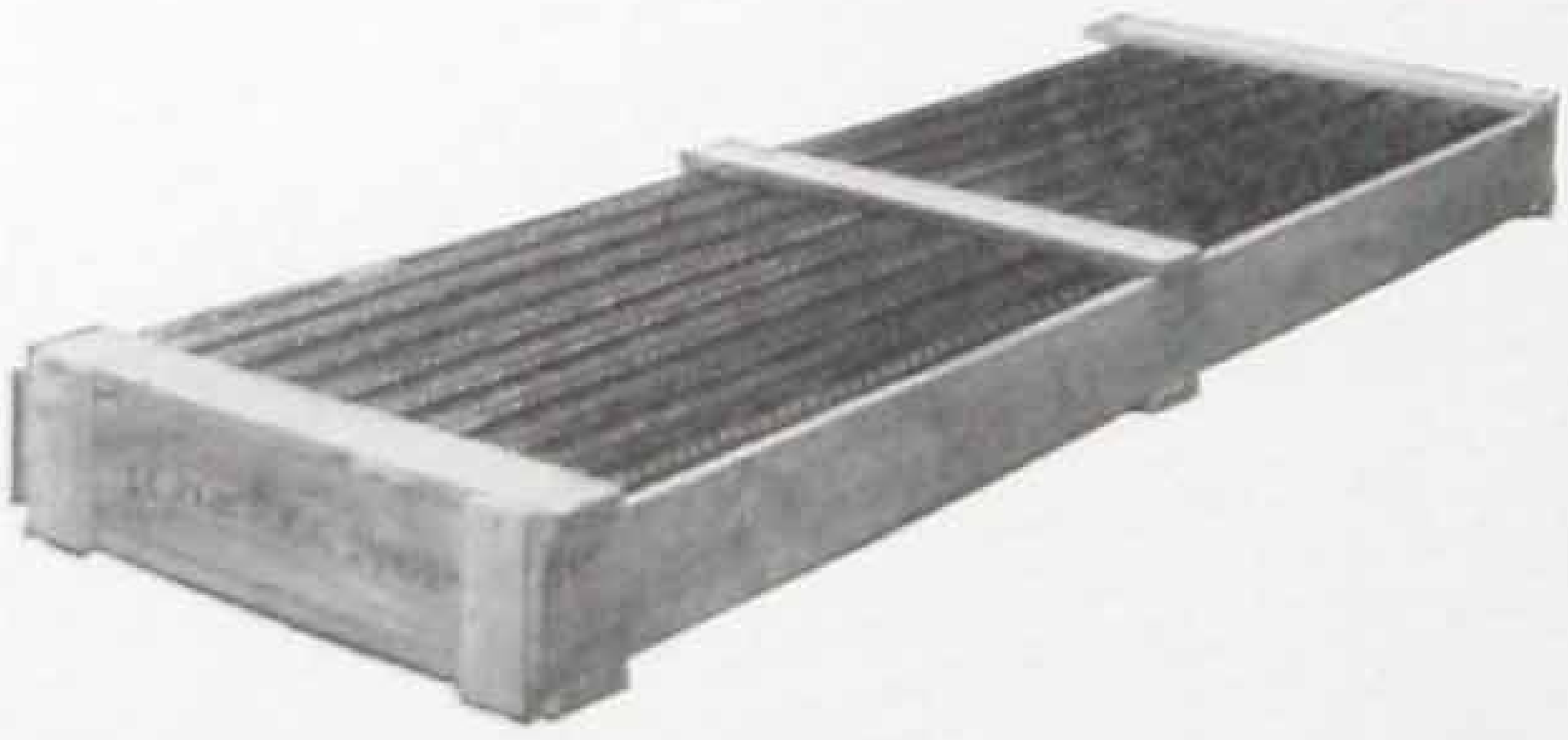
Furnished either painted or galvanized—no unpainted material.

Gauge	Painted Weight	Galvanized Weight	Effective Sectional Area Per Ft. of Width	Shipping Weight Per Sq. Ft. Crated Painted Material
28	.58 lbs.	.72 lbs.	.173 sq. in.	.70 lbs.
26	.70 lbs.	.90 lbs.	.208 sq. in.	.82 lbs.
24	.93 lbs.	Not Made	.277 sq. in.	1.07 lbs.

Galvanized Self-Sentering furnished on special order only.

On special order we can furnish the following gauges:—

Gauge	Painted Weight	Galvanized Weight	Effective Sectional Area Per Ft. of Width	Shipping Weight Per Sq. Ft. Crated Painted Material
27	.64 lbs.	.78 lbs.	.187 sq. in.	.75 lbs.
25	.81 lbs.	.96 lbs.	.243 sq. in.	.94 lbs.
22	1.17 lbs.	Not Made	.346 sq. in.	1.30 lbs.



Note that Self-Sentering made from galvanized sheets, also from Armco Iron and all special gauges, as shown above, is only furnished on special order and with the usual delays incident to mill delivery of sheets.

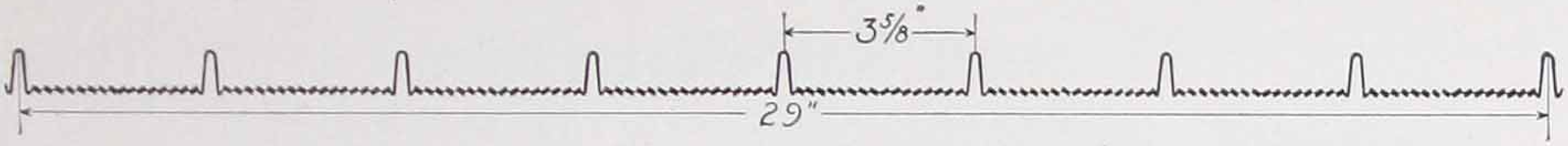
Self-Sentering is bundled for domestic shipment in skeleton crates—ends and edges protected by solid wooden strips with heavy cleats across both top and bottom of bundle. Packed 28 or 26 gauge, 14 sheets to the bundle; 24 gauge, 12 sheets to the bundle.

Table of Square Feet Per Crate

28 or 26 Gauge 14 Sheets Per Crate		24 Gauge 12 Sheets Per Crate	
Lengths	Sq. Ft.	Lengths	Sq. Ft.
5 ft.	169.1	5 ft.	145
6 ft.	203	6 ft.	174
7 ft.	236.8	7 ft.	203
8 ft.	270.6	8 ft.	232
9 ft.	304.5	9 ft.	261
10 ft.	338.3	10 ft.	290
11 ft.	372.1	11 ft.	319
12 ft.	406	12 ft.	348

Table of Square Feet, Sheets of Various Lengths

1 in.	.202	6 ft. 0 in.	14.5
3 in.	.604	6 ft. 6 in.	15.7
4 in.	.806	7 ft. 0 in.	17.0
6 in.	1.21	7 ft. 6 in.	18.2
1 ft. 0 in.	2.42	8 ft. 0 in.	19.4
1 ft. 6 in.	3.7	8 ft. 6 in.	20.6
2 ft. 0 in.	4.9	9 ft. 0 in.	21.8
2 ft. 6 in.	6.1	9 ft. 6 in.	23.0
3 ft. 0 in.	7.3	10 ft. 0 in.	24.2
3 ft. 6 in.	8.5	10 ft. 6 in.	25.4
4 ft. 0 in.	9.7	11 ft. 0 in.	26.6
4 ft. 6 in.	10.9	11 ft. 6 in.	27.8
5 ft. 0 in.	12.1	12 ft. 0 in.	29.0
5 ft. 6 in.	13.3		



Cross Section of Self-Sentering—full width of sheet
Note particularly the close spacing of the ribs and the great width of the sheet

In figuring the covering capacity of Self-Sentering, side laps need not be considered as they are provided for without charge and each sheet has a covering capacity of 29 inches in width. End laps must be allowed as indicated in the specifications.

Self-Sentering Punch

This punch is used to eliminate a large proportion of wiring at the laps of Self-Sentering sheets. By its use the interlocking ribs are securely clinched, making further tying unnecessary. Such work is very rapid and leaves absolutely no play in the joints and no opportunity for sheets to sag or bulge. Punches are well made of the best of materials to stand up under this work for years. Shipping weight, nine pounds.

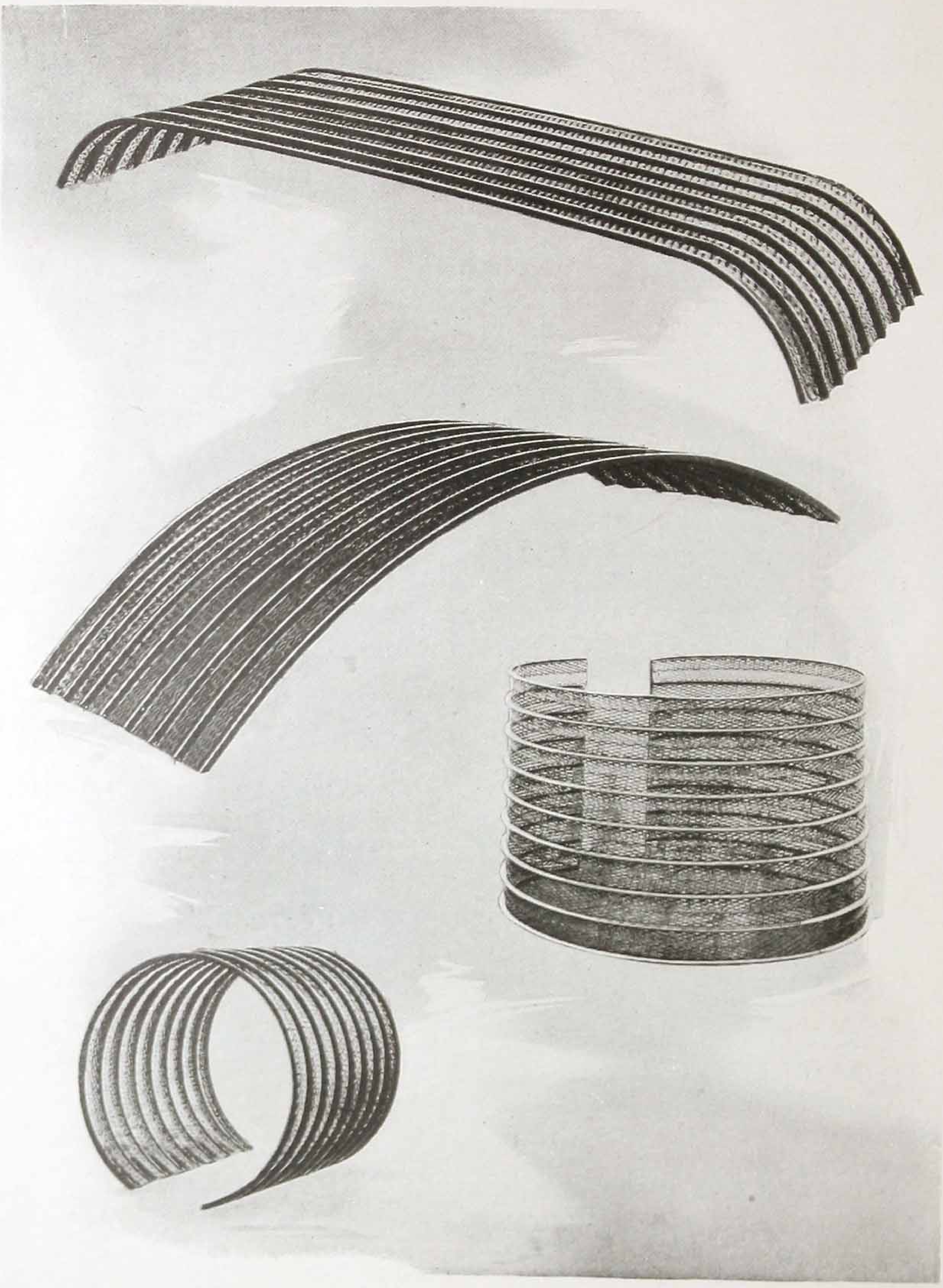
Self-Sentering for Export Shipment

Self-Sentering for export is carefully bundled—not crated, which would increase ocean freight materially. Special attention is given to this feature and shipments to any part of the world reach destinations in first-class condition.

Shipping Data for Domestic Shipments Only

Length Sheet	No. of Sheets Per Bundle			Number of Square Feet Per Bundle			Approx. Weight Per Bundle in Pounds		
Feet	24 Ga.	26 Ga.	28 Ga.	24 Ga.	26 Ga.	28 Ga.	24 Ga.	26 Ga.	28 Ga.
4	12	12	12	116.0	116.0	116.0	108	82	68
5	12	12	12	145.0	145.0	145.0	135	102	85
6	12	12	12	174.0	174.0	174.0	162	122	101
7	12	12	12	203.0	203.0	203.0	189	142	118
8	12	12	12	232.0	232.0	232.0	216	163	135
9	12	12	12	261.0	261.0	261.0	243	183	152
10	10	12	12	241.7	290.0	290.0	225	203	169
11	8	10	12	212.7	265.9	319.0	198	187	185
12	8	10	12	232.0	290.0	348.0	216	203	202

Curved Self-Sentering



Self-Sentering can be curved at our factory to any desired radius—12 inches or larger. This bending is done by special rolls which insure uniformity in the curve not otherwise obtainable and the cost of this work as done in the factory is much lower than if done on the job.

Curved Self-Sentering is adaptable for arched floor or roof slabs, silos, tanks, conduits, chimneys or culverts—any curved work where the stresses follow the line of the curve. On work where the ribs run at right angles to the curve, the material can be readily formed as it is placed, due to its uniform pliability.

Self-Sentering can be furnished bent in any of the following methods:

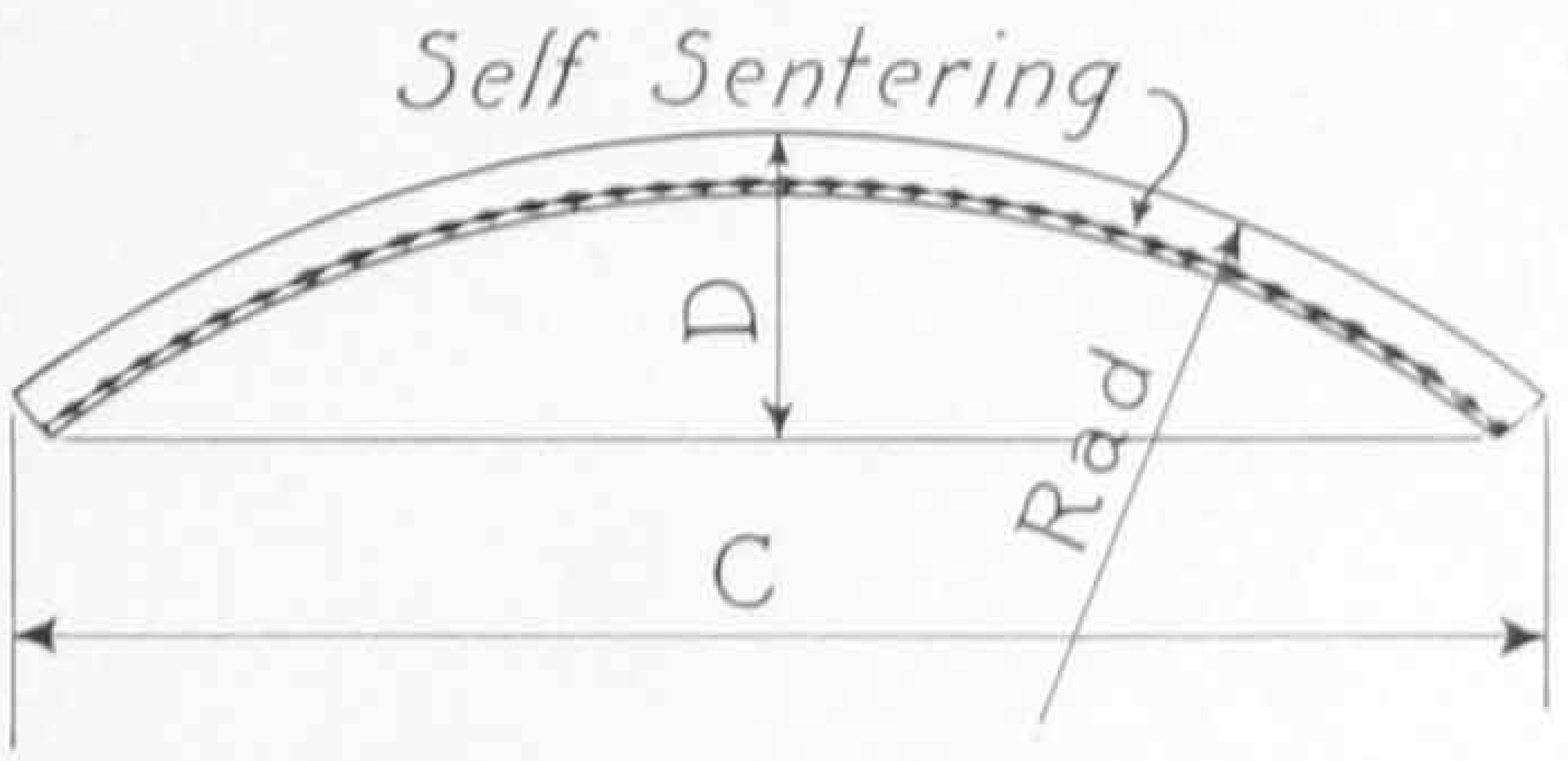
Any portion of a circle with a radius 12 inches or over, up to a complete circumference.

Sheets with center portion flat and one or both ends curved to any radius 12 inches or over. Self-Sentering can be furnished curved with ribs on only the outside of the arc.

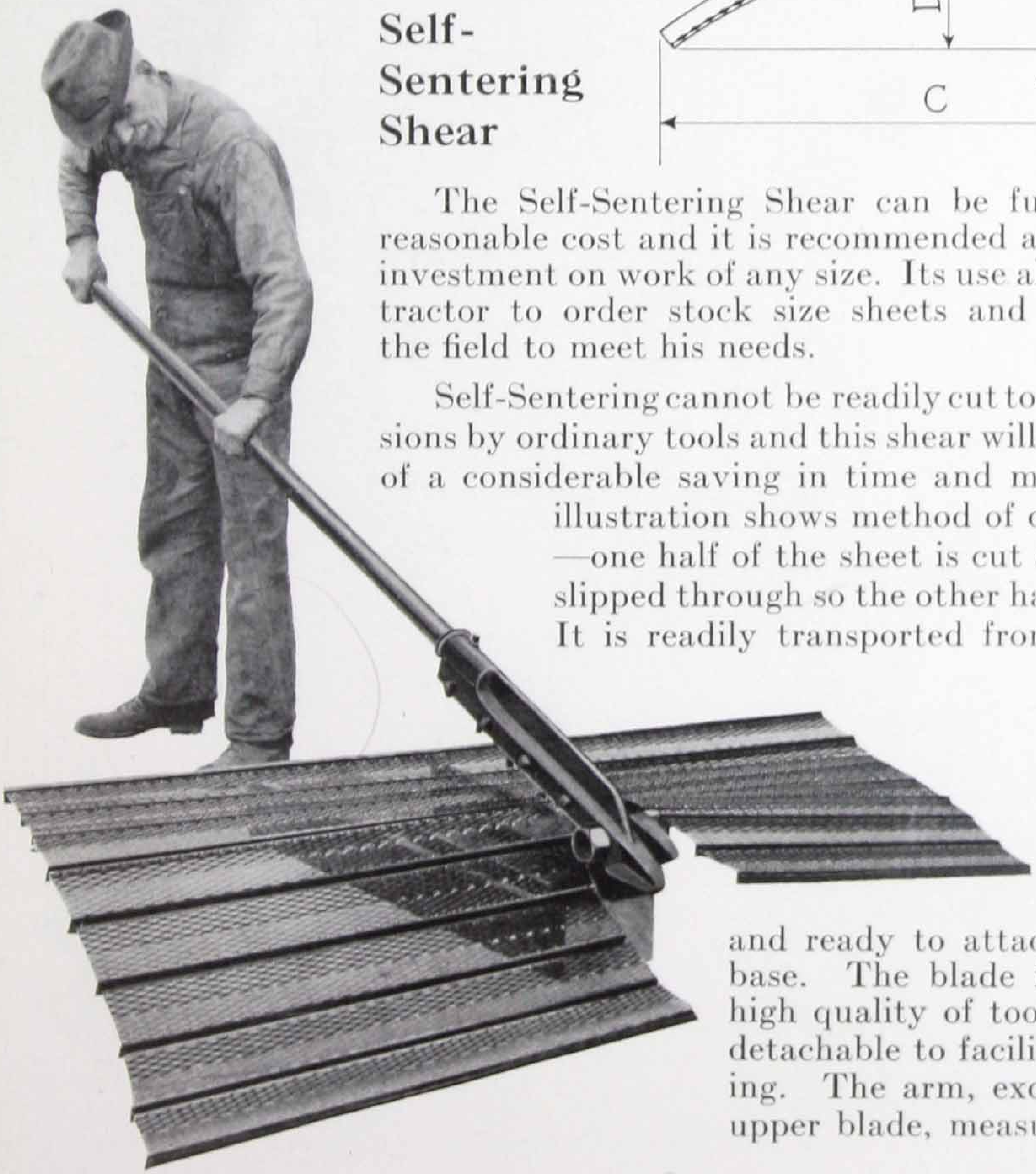
While curved or arched construction is recognized as the strongest type, the expense of curved form work has been almost prohibitive. Self-Sentering, acting as both form and reinforcement, removes this objection.

Instructions for Ordering Curved Sheets

In ordering curved sheets be sure to always give the exact length of the chord as indicated by C on sketch shown, and height of rise as indicated by D. Where possible, the radius to which sheets are to be curved should also be given.



Self-Sentering Shear



The Self-Sentering Shear can be furnished at a reasonable cost and it is recommended as a profitable investment on work of any size. Its use allows the contractor to order stock size sheets and cut them in the field to meet his needs.

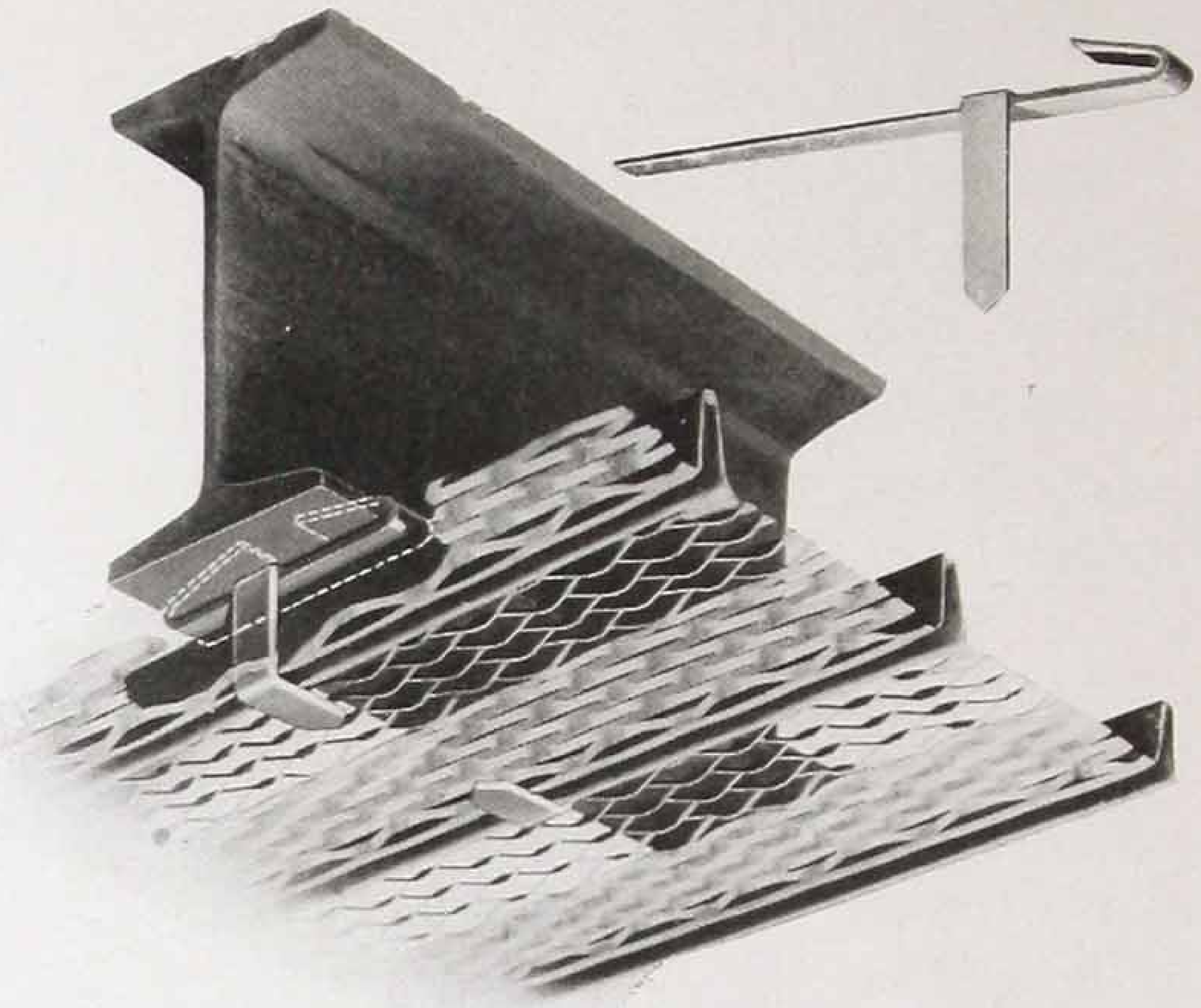
Self-Sentering cannot be readily cut to exact dimensions by ordinary tools and this shear will be the means of a considerable saving in time and material. The illustration shows method of cutting sheets—one half of the sheet is cut and the sheet slipped through so the other half can be cut. It is readily transported from one job to another, as it weighs but 72 pounds. We furnish the shear complete and ready to attach to a wood base. The blade is made of a high quality of tool steel and is detachable to facilitate sharpening. The arm, exclusive of the upper blade, measures five feet.

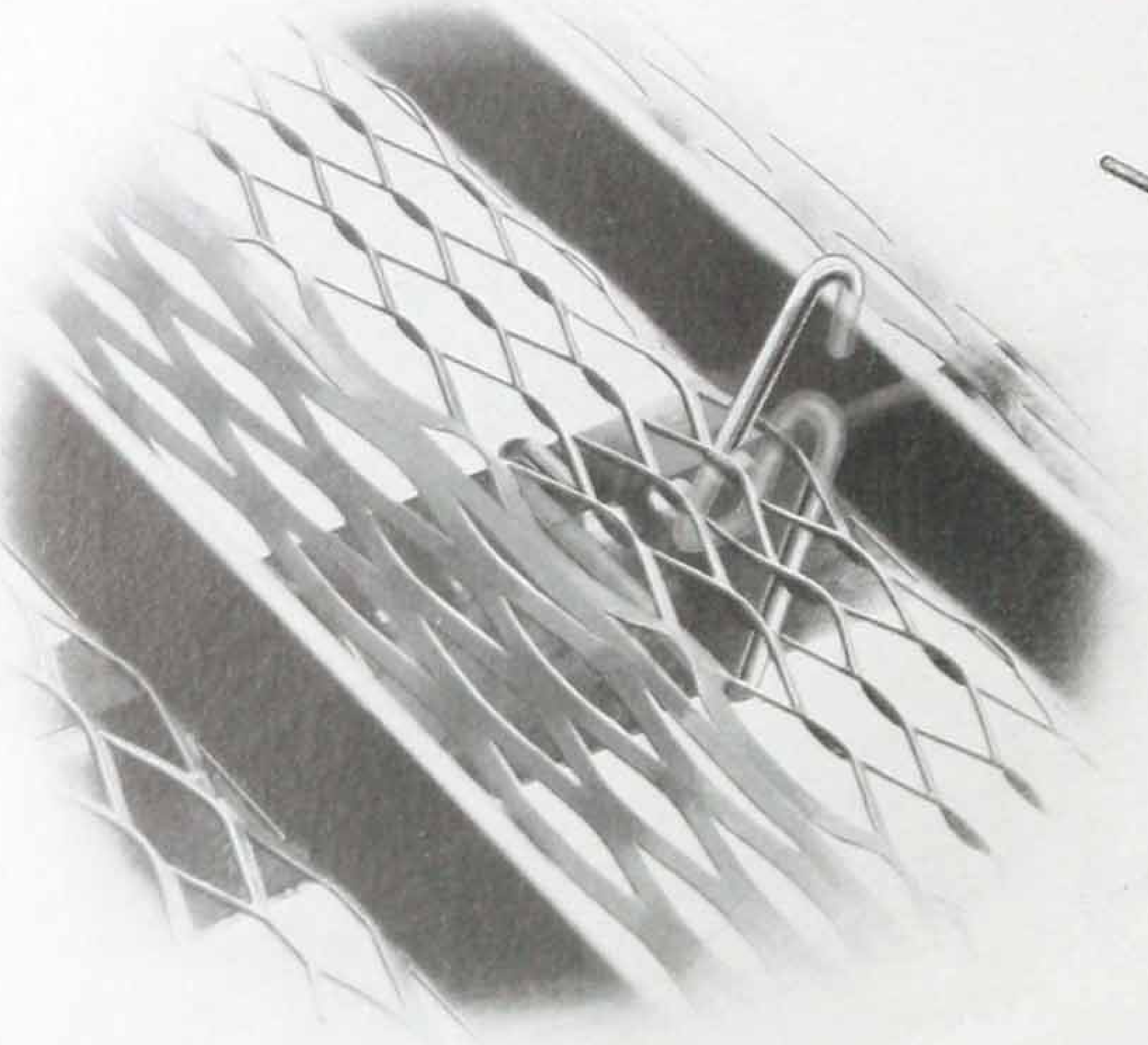
Self-Sentering Clips

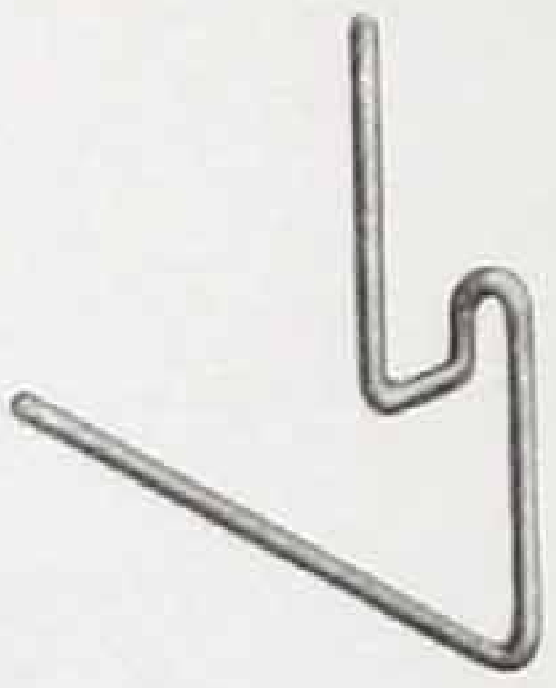
Ceiling Clip

This clip is for fastening Self-Sentering to the underside of I Beams and Channels. The prong is electrically welded to the clip and the device possesses unusual strength. It is very simple of application and is made in the following sizes for the various structural members.

Style No.	For Use On
C—1	8″ to 12″ I Beams
C—2	15″ and 18″ I Beams
C—3	20″ and 24″ I Beams
C—4	3″ and 4″ Channels
C—5	5″ and 6″ Channels
C—6	7″ and 8″ Channels
C—7	9″ and 10″ Channels
C—8	12″ and 15″ Channels







Clip No. 4

This clip is used for attaching Self-Sentering to all angles. Always give the size of angles to be used, or order by following style numbers:

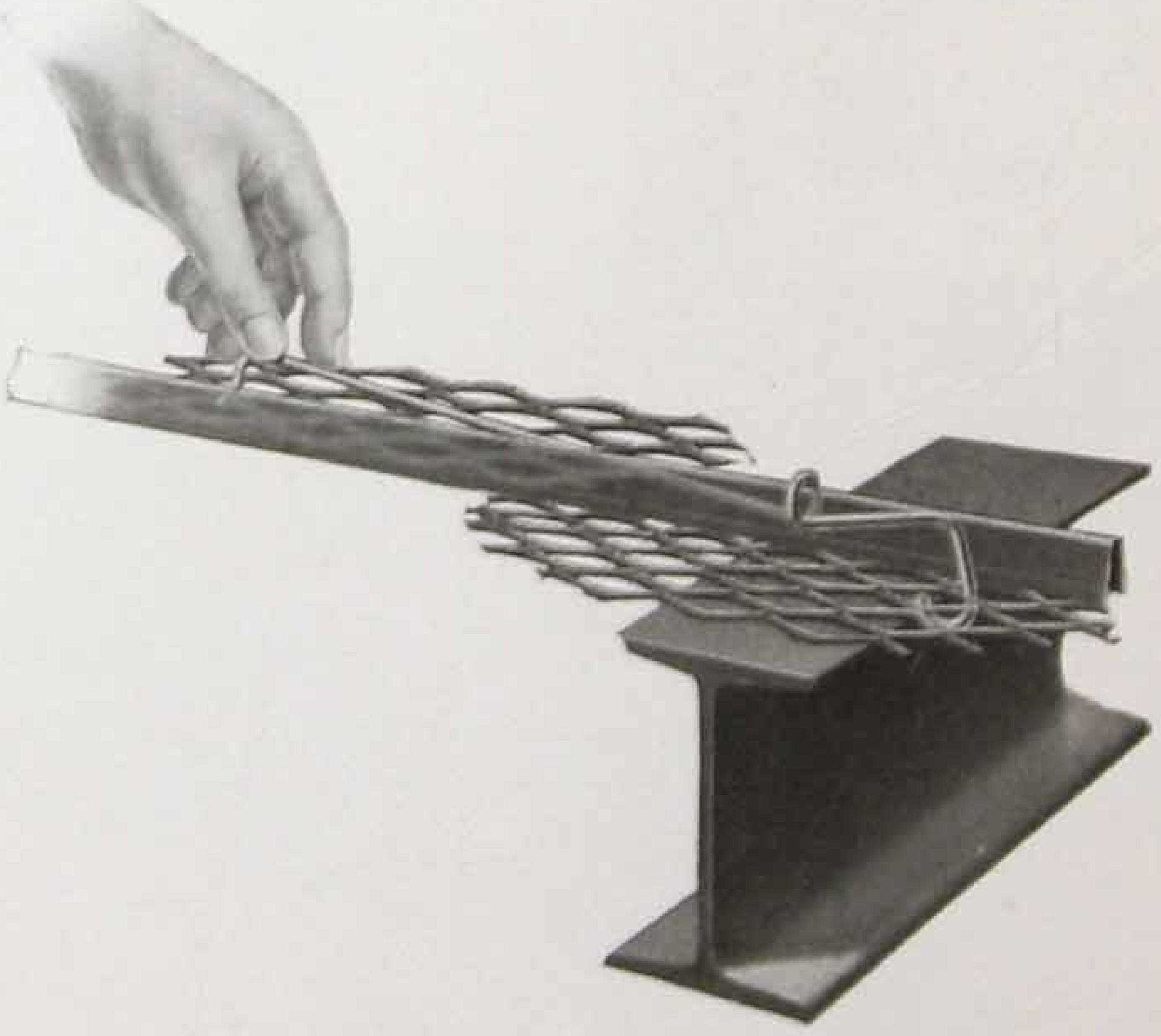
Angles under 3 in. x 3 in.
Style 4.75

Angles over 3 in. x 3 in.
Style 4.10

Both of these clips are made of No. 10 U. S. Gauge soft annealed wire and are very easy to place.

Clip No. 7

This clip for fastening Self-Sentering to the face of I beams, channels or angles in the construction of roofs and floors, is very effective. Applied entirely from the upper side and one man can place them very rapidly. The hook end of the clip is inserted through the mesh to the side of the rib. Clip is drawn up until hook rests against under side of flange. Then the V-shaped portion is placed astride the rib and free end is brought down to the mesh and hooked under one of the strands.



Data Regarding Loads

TABLE No. 1

For ordinary spans, Self-Sentering does not require centering, but to insure best results the spans shown in table following should not be exceeded without using temporary supports until concrete has set. These spans are center to center of supports.

Gauge	Slab Thickness				
	1½ in.	2 in.	2½ in.	3 in.	3½ in.
28	3′ 8″	3′ 3″	3′ 0″	2′ 9″	2′ 6″
26	4′ 0″	3′ 6″	3′ 3″	3′ 0″	2′ 9″
24	4′ 6″	4′ 0″	3′ 8″	3′ 4″	3′ 0″

TABLE No. 2

The following load table shows *safe live loads* per square foot, uniformly distributed, and in using this table the dead load need not be taken into further consideration. To get the total safe load, add to the figures shown 12 pounds for each inch in thickness of the slab, plus 6 pounds per square foot for the undercoating of plaster. For instance, a 2-inch slab would weigh 2 x 12=24+6=30 pounds per square foot; thus a 2-inch slab reinforced with 24 Gauge Self-Sentering on a 4-foot span is good for a live load of 258 pounds per square foot, or a total safe load of 258 pounds plus 30 pounds, which equals 288 pounds per square foot.

The slab thickness as shown, in every instance, is considered as above the base of the Self-Sentering and the plastered coat underneath is not included in the computation. The tables are based on a 1:2:4 concrete mix.

Round rods should always be placed over the top of the heavy ribs to take care of temperature stresses. These should be about ¼-inch diameter or No. 5 wire, spaced 30 inches on centers and run at right angles to the ribs.

Safe uniformly distributed live loads per square foot on Self-Sentering Slabs

Assumptions:

Stress in steel—16,000 pounds per square inch.

Ratio between the moduli of elasticity—15.

Center of gravity—.19 of an inch above bottom of slab.

R. M.=Resisting Moments per foot width in inch pounds; f c=maximum extreme fiber stress in concrete.

Gauge	Thickness of Slab above Mesh	R. M.	f c	Span								
				3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.
28 Self-Sentering	2″	4360	660	310	164	98	61					
26 Self Sentering	2″	5190	760	359	192	128	92	49				
24 Self-Sentering	2″	6210	800	476	258	166	110	64	30			
22 Self-Sentering	2″	6420	800		305	183	118	79	54	36		
28 Self-Sentering	2½″	5625	560	419	233	150	93	57				
26 Self-Sentering	2½″	6710	650	484	279	186	118	76	50			
24 Self Sentering	2½″	8720	680		377	254	165	111	76			
22 Self-Sentering	2½″	9840	800		474	291	190	131	92	65	46	
28 Self Sentering	3″	6920	500	561	311	184	114	73	45			
26 Self-Sentering	3″	8240	560		386	231	147	97	64			
24 Self-Sentering	3″	10820	660		512	322	210	143	100	69	47	
22 Self-Sentering	3″	13320	780			403	266	185	132	96	69	50
28 Self Sentering	3½″	8250	460		368	218	135	80	50			
26 Self-Sentering	3½″	9800	500		455	274	174	115	76	50		
24 Self-Sentering	3½″	12750	610			375	245	166	116	81	56	
22 Self-Sentering	3½″	15840	705				318	222	157	115	84	61
28 Self-Sentering	4″	9500	425		439	261	164	105	68			
26 Self-Sentering	4″	11300	460		533	320	206	136	91	60	31	
24 Self-Sentering	4″	14800	560			436	286	196	137	96	67	46
22 Self-Sentering	4″	18420	645				371	261	186	136	99	72

Table for Determining Roof Purlins

TABLE No. 6

This table will be found useful in designing Self-Sentering roofs and floors and incidentally serve to show the comparatively light framing required for this class of construction.

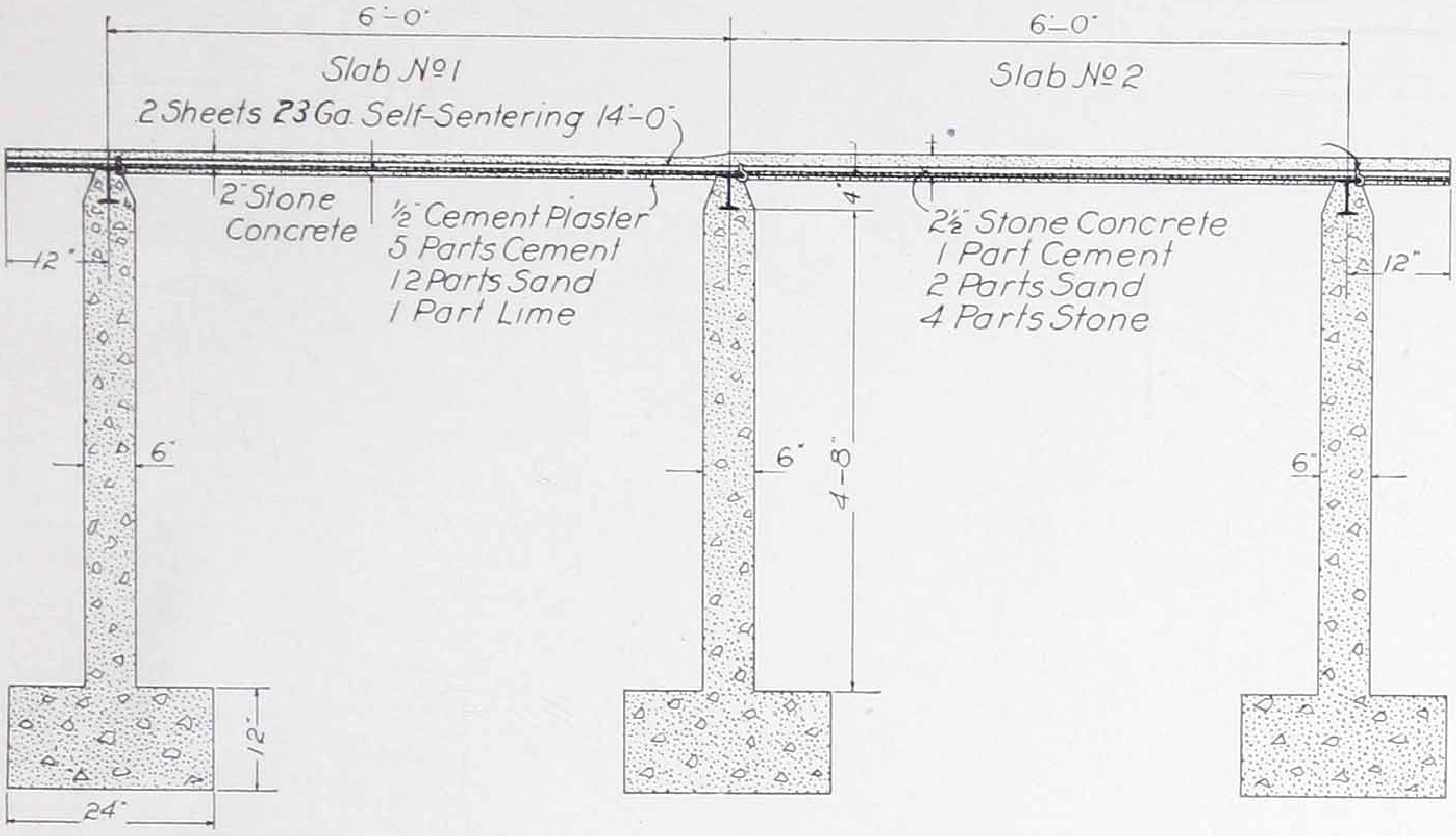
Sizes and Weights per sq. ft. of Purlins to carry Roof Loads.

Loads Assumed
- Concrete—12½ lbs. per sq. ft. per inch thickness
- Waterproofing—3 lbs. per sq. ft.
- Snow and Wind—30 lbs. per sq. ft.

Purlin Spacing	Truss Spacing	12′-0″			14′-0″			16′-0″			18′-0″		
	Slab Thickness	2″	2½″	3″	2″	2½″	3″	2″	2½″	3″	2″	2½″	3″
4′-0″	Panel Load	2784	3084	3384	3248	3598	3848	3712	4112	4512	4176	4626	5076
	Size of Purlin	6″[	6″[	6″[	6″[	7″[	7″[	7″[	8″[	8″[	9″[	9″[	9″[
	Wt. Purlin per □′ Roof	2.0	2.0	2.0	2.0	2.44	2.44	2.44	2.81	2.81	3.31	3.31	3.31
4′-6″	Panel Load	3132	3470	3807	3654	4048	4442	4176	4626	5076	4698	5204	5711
	Size of Purlin	6″[	6″[	6″[	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[
	Wt. Purlin per □′ Roof	1.77	1.77	1.77	2.17	2.17	2.17	2.5	2.5	2.5	2.94	2.94	2.94
5′-0″	Panel Load	3480	3855	4230	4060	4498	4935	4640	5140	5640	5220	5783	6345
	Size of Purlin	6″[	7″[	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[	8″I
	Wt. Purlin per □′ Roof	1.6	1.95	1.95	1.95	1.95	2.25	2.25	2.25	2.65	2.65	2.65	3.6
5′-6″	Panel Load	3828	4241	4653	4466	4947	5429	5104	5654	6204	5742	6361	6980
	Size of Purlin	7″[	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	8″I	8″I	9″I
	Wt. Purlin per □′ Roof	1.77	1.77	1.77	1.77	2.05	2.05	2.05	2.41	2.41	3.27	3.27	3.82
6′-0″	Panel Load	4176	4626	5076	4872	5397	5922	5568	6168	6768	6264	6939	7614
	Size of Purlin	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[	8″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.62	1.62	1.62	1.88	1.88	1.88	2.21	2.21	2.21	3.0	3.5	3.5
6′-6″	Panel Load	4530	5010	5500	5250	5850	6410	6030	6670	7330	6780	7520	8240
	Size of Purlin	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[	10″[	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.5	1.5	1.73	1.73	1.73	2.04	2.04	2.04	2.31	3.23	3.23	3.23
7′-0″	Panel Load	4870	5400	5820	5690	6300	6910	6490	7180	7880	7300	8100	8880
	Size of Purlin	7″[	7″[	8″[	8″[	9″[	9″[	9″[	10″[	10″[	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.39	1.39	1.6	1.6	1.89	1.89	1.89	2.14	2.14	3.0	3.0	3.0
7′-6″	Panel Load	5220	5780	6350	6080	6740	7400	6960	7700	8450	7820	8680	9510
	Size of Purlin	7″[	8″[	8″[	8″[	9″[	9″[	9″[	10″[	10″[	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.3	1.5	1.5	1.5	1.77	1.77	1.77	2.0	2.0	2.8	2.8	2.8
8′-0″	Panel Load	5570	6170	6770	6500	7200	7900	7420	8230	9000	8340	9240	10152
	Size of Purlin	8″[	8″[	8″[	9″[	9″[	9″[	10″[	10″[	8″I	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.4	1.4	1.4	1.66	1.66	1.66	1.87	1.87	2.25	2.61	2.61	2.61

To find weight of purlin per linear foot, multiply weight per square foot of roof by purlin spacing.

Load and Fire Test



These tests were conducted on October 26, 1912, and November 20, 1912. The test slabs were built as indicated in sketch shown above, using No. 24 Gauge Self-Sentering on 6-foot spans, Slab No. 1 being a 2-inch slab designed for a uniformly distributed live load of 126 pounds per square foot, and Slab No. 2 a 2½-inch slab designed for a uniformly distributed live load of 156 pounds per square foot. The tables shown on pages 14 and 15 give an accurate reading of deflections noted.

At the completion of the load test, the 2-inch slab (No. 1) showed a maximum deflection of .16 inch, which increased to .205 inch twenty-four hours later. This was about 1/352 of the span.

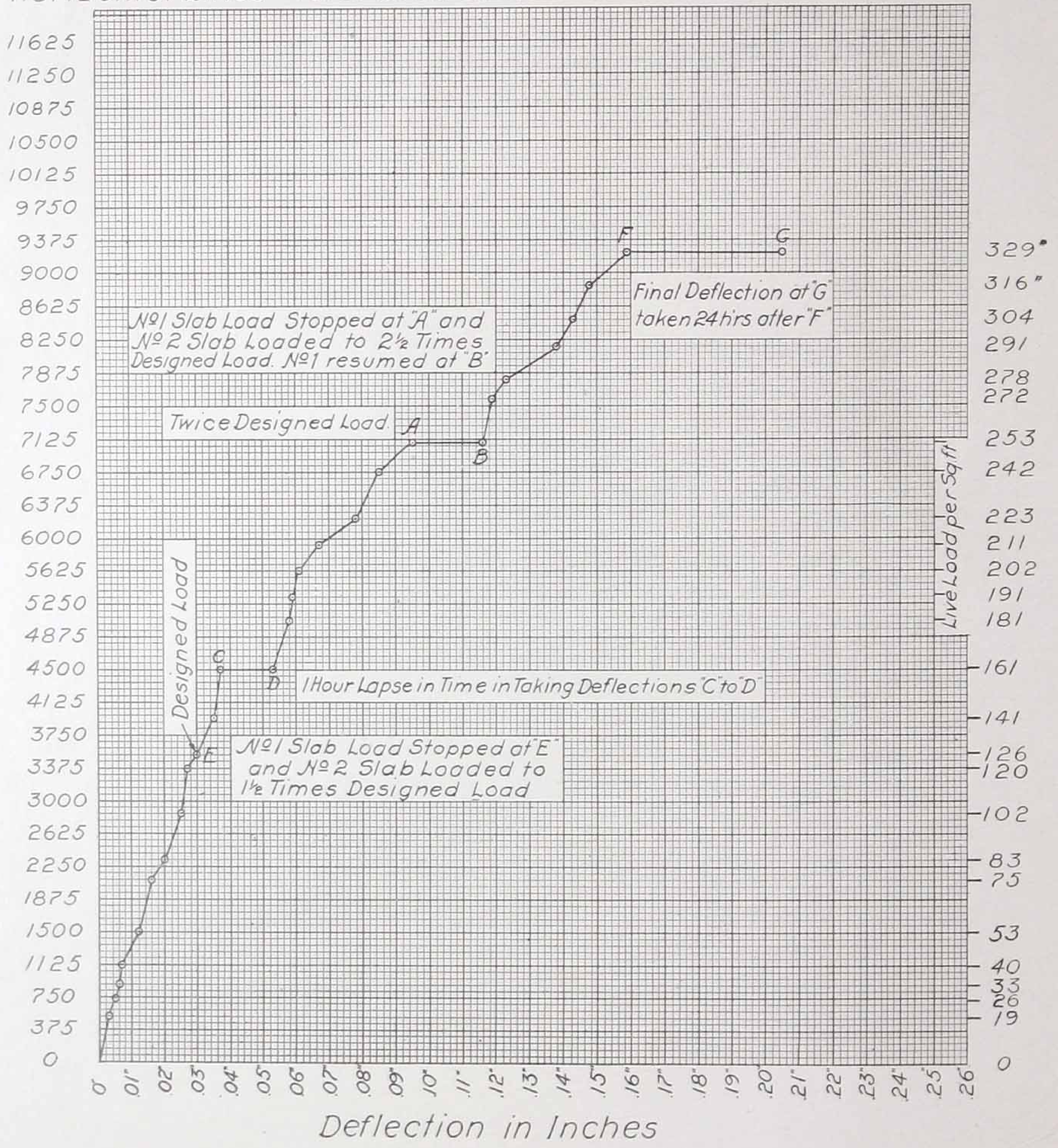
Slab No. 2 showed a deflection of .16 inch at the completion of the test and .19 inch twenty-four hours later, or about 1/378 of the span.

No cracks appeared in the underside of either slab. (Note that final load was 2½ times the designed load.)

At the end of 25 days there was no appreciable increase in the deflection and on November 20th a fire test of the Slab No. 2, still loaded, was conducted.

Photographic records of this test on page 16.

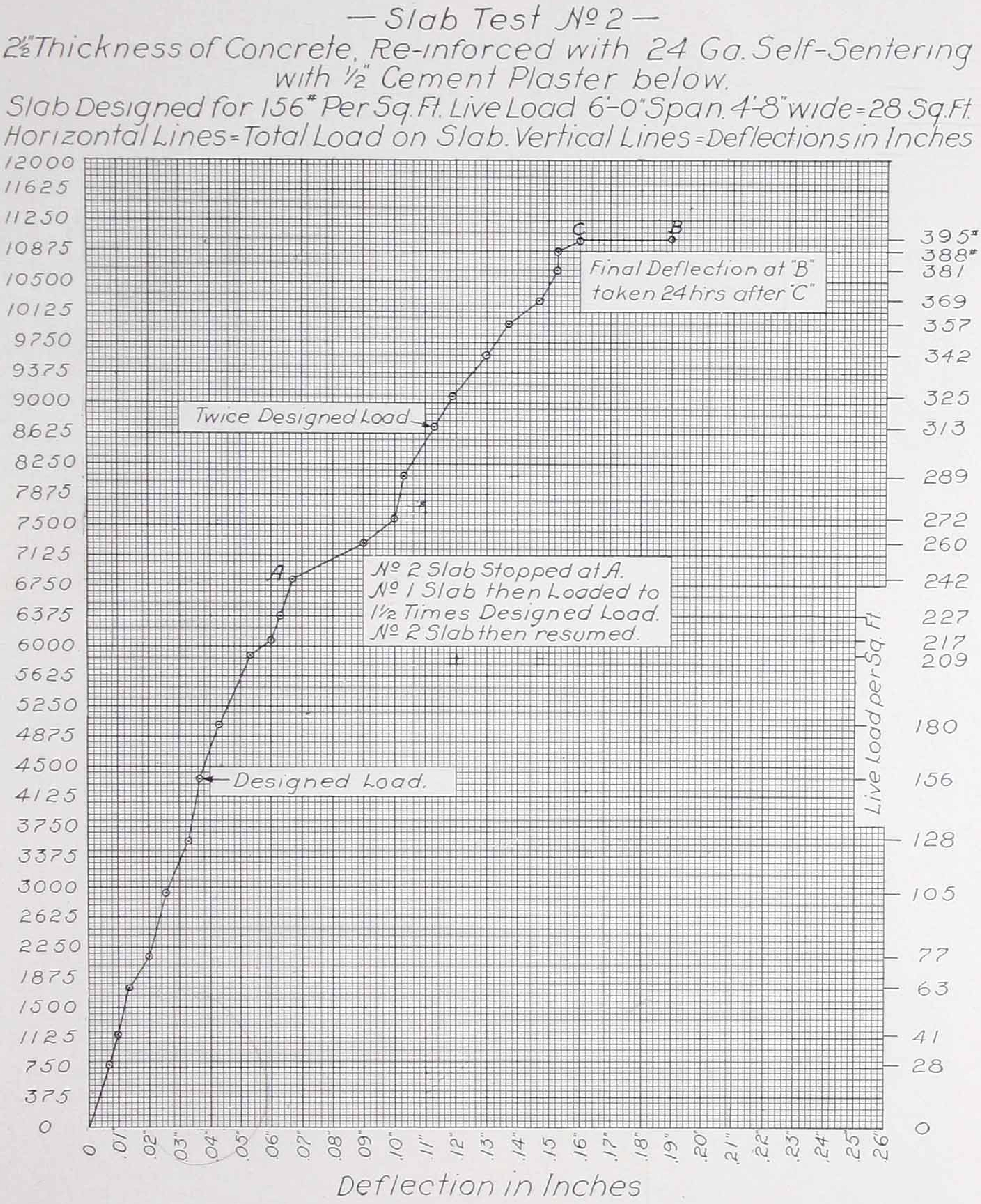
Table No. 11



-Slab Test No 1-
2" Thickness of Concrete, Re-inforced with 24 Ga. Self-Sentering
with ½" Cement Plaster below.
Slab Designed for 126# Per Sq. Ft. Live Load. 6'-0" Span 4'-8" Wide=28 Sq. Ft.
Horizontal Lines = Total Load on Slab. Vertical Lines=Deflections in inches

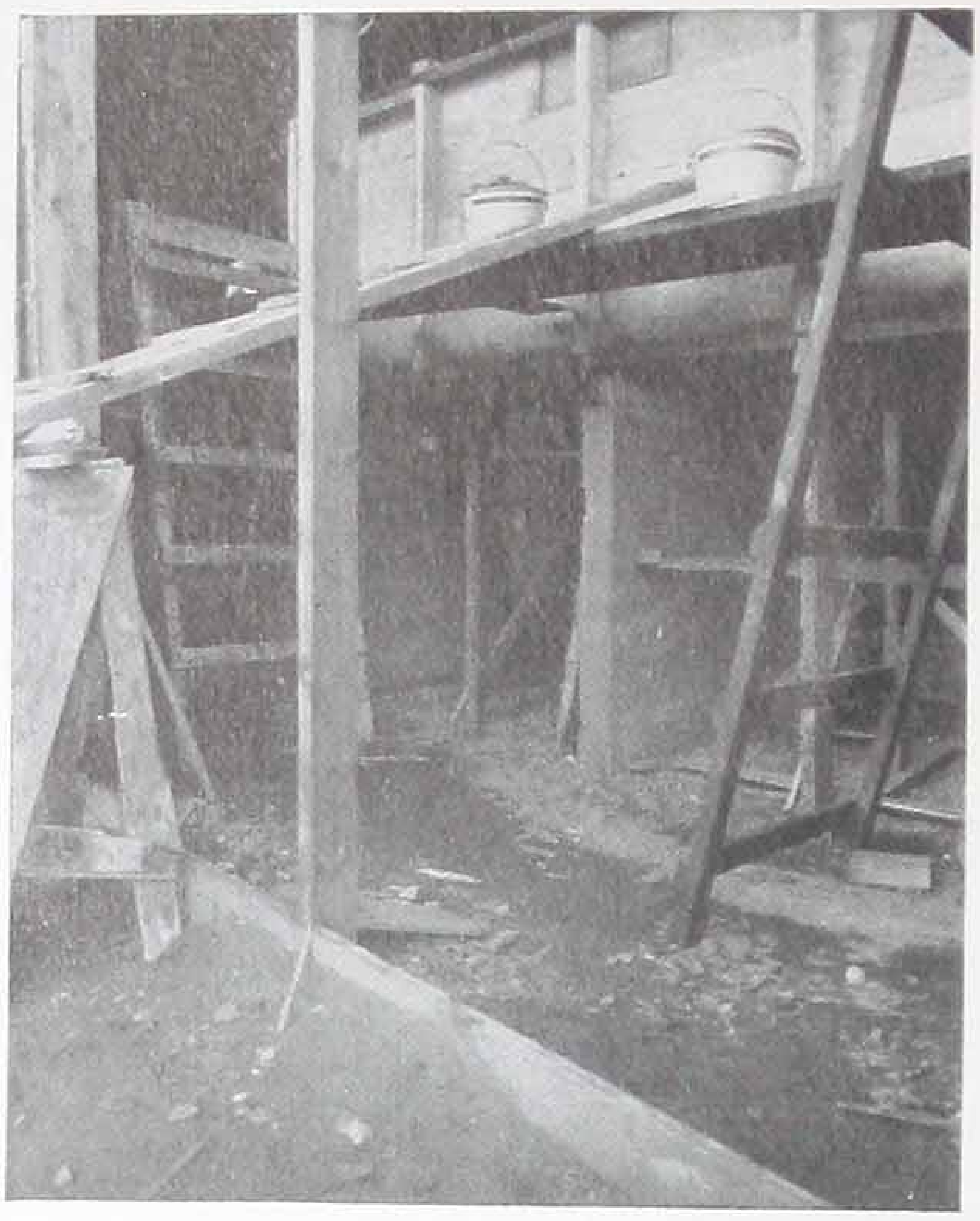
A furnace was built under the slab and heat furnished by burning coal oil introduced into the furnace under high pressure. The test was continued for two hours with an average temperature after the first half hour of 1612 degrees, with a maximum temperature of 1725 degrees. At the end of the two-hour test, water at city pressure was turned on the underside of the slab from a distance of 20 feet for a

Table No. 12

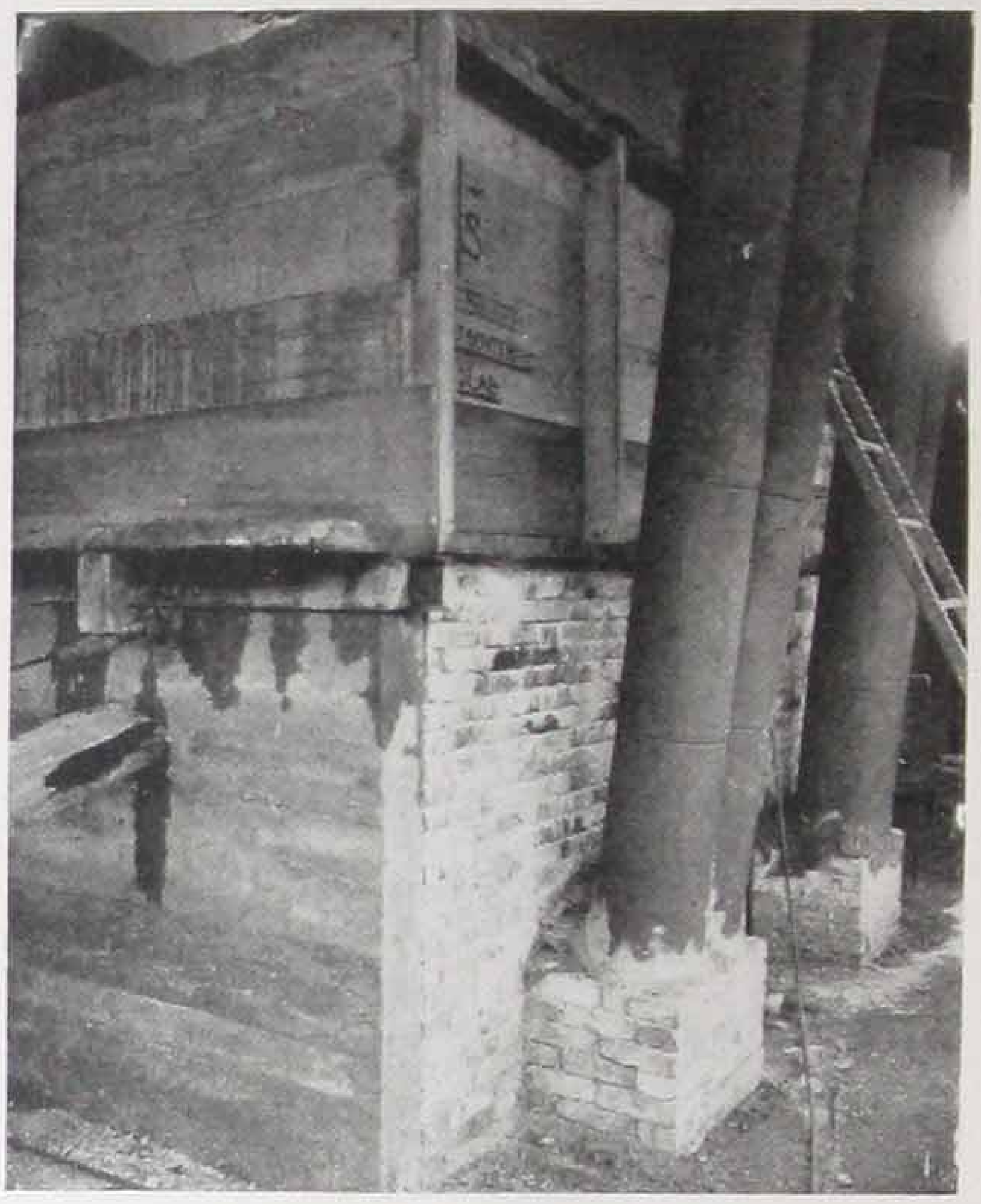


period of 2½ minutes. The finish coat of plaster spalled off, but the metal was not exposed at any point. A number of fine cracks were apparent—running in both directions—and the total deflection of the slab (still loaded to 394 pounds per square foot), was about 1½ inches.

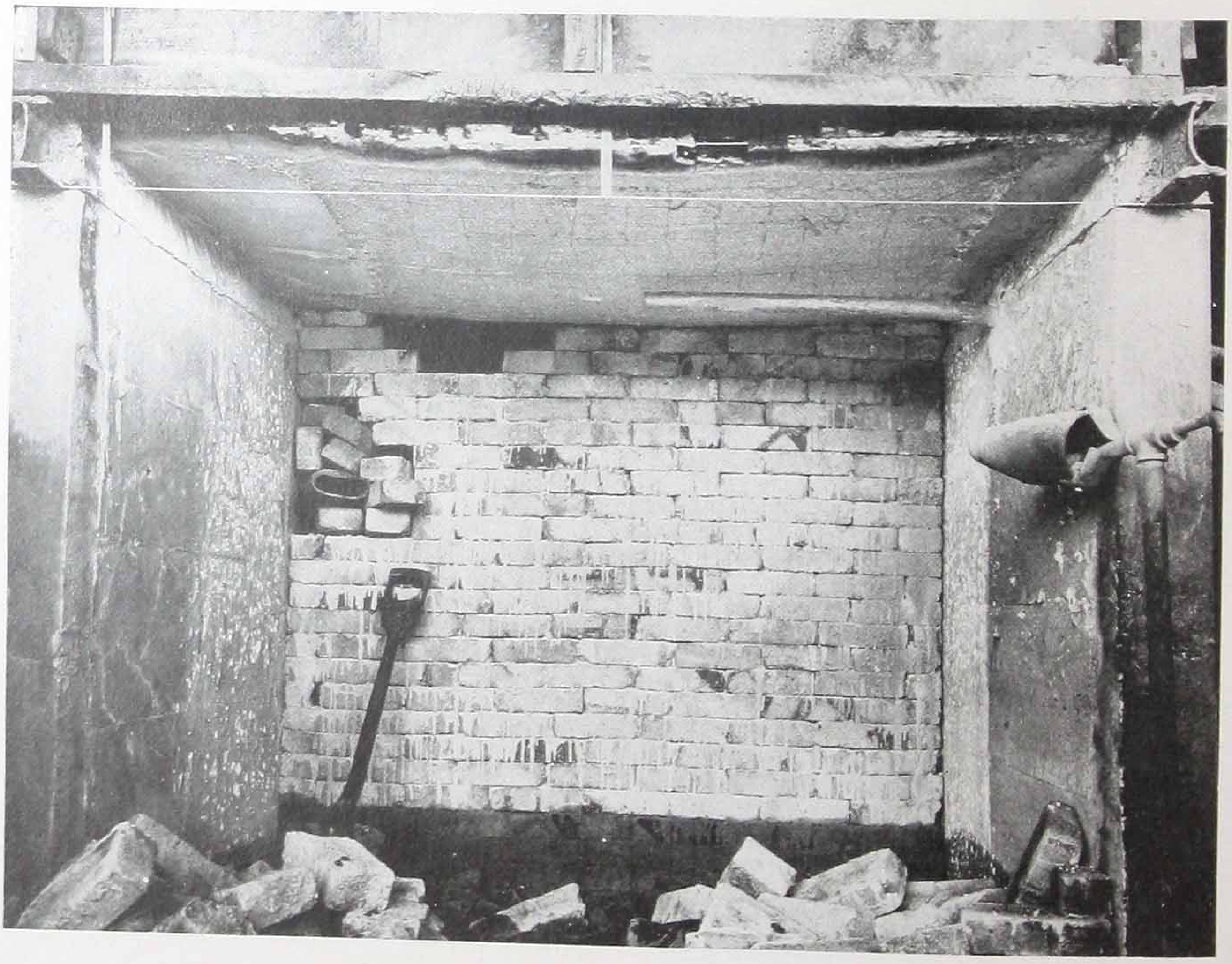
The photographs shown on page 16 give a good idea of the method of conducting the test and the results obtained.



Self-Sentering Slab During Load Test

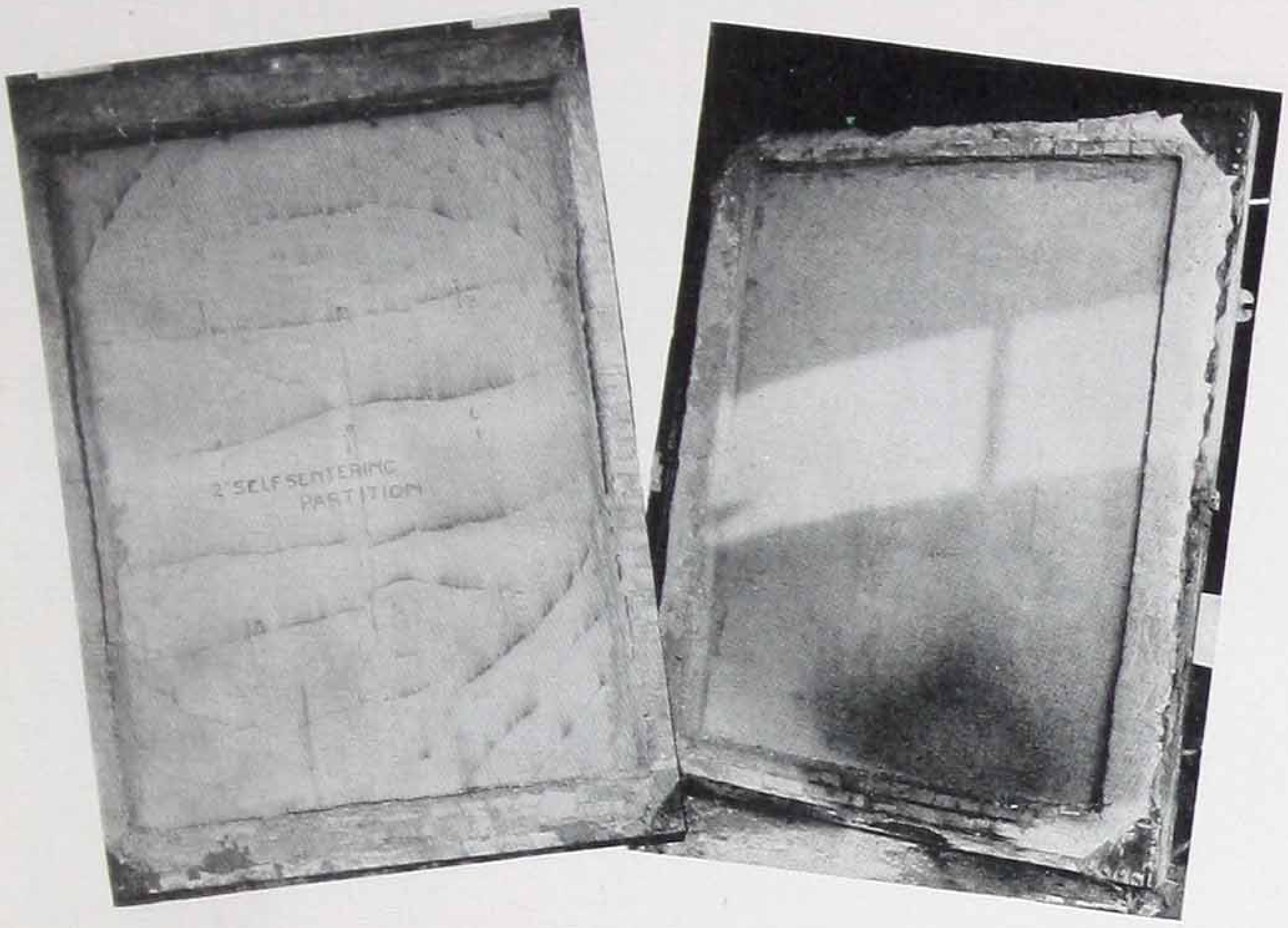


Self-Sentering Slab During Fire Test



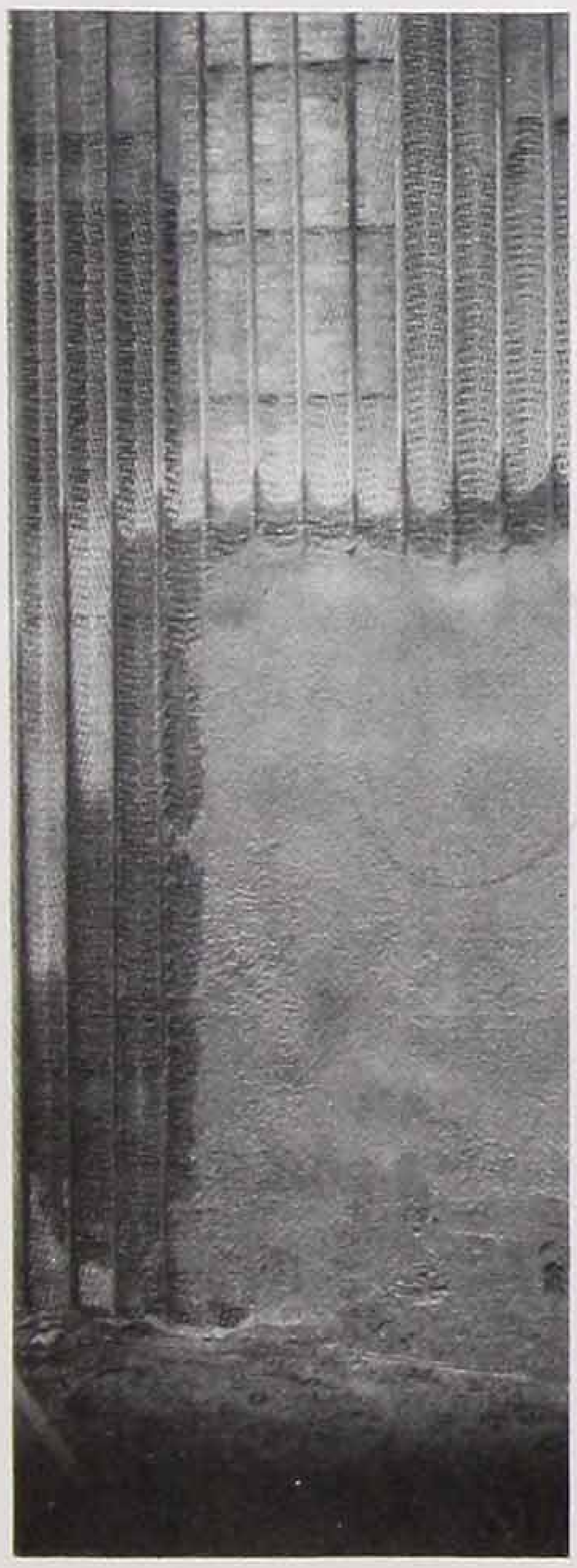
Underside of Self-Sentering Slab after Fire Test
(For explanation, see page 13)

Fire Test on Self-Sentering Partition



A fire test of Self-Sentering 2-inch solid partitions was made on November 20, 1912.

The partition was 7 feet wide by 9 feet high; the Self-Sentering was run vertically and plastered on both sides with cement plaster to a total thickness of 2 inches. This partition formed the door for the furnace in which the heat was generated. Kerosene oil under high pressure was used as fuel.



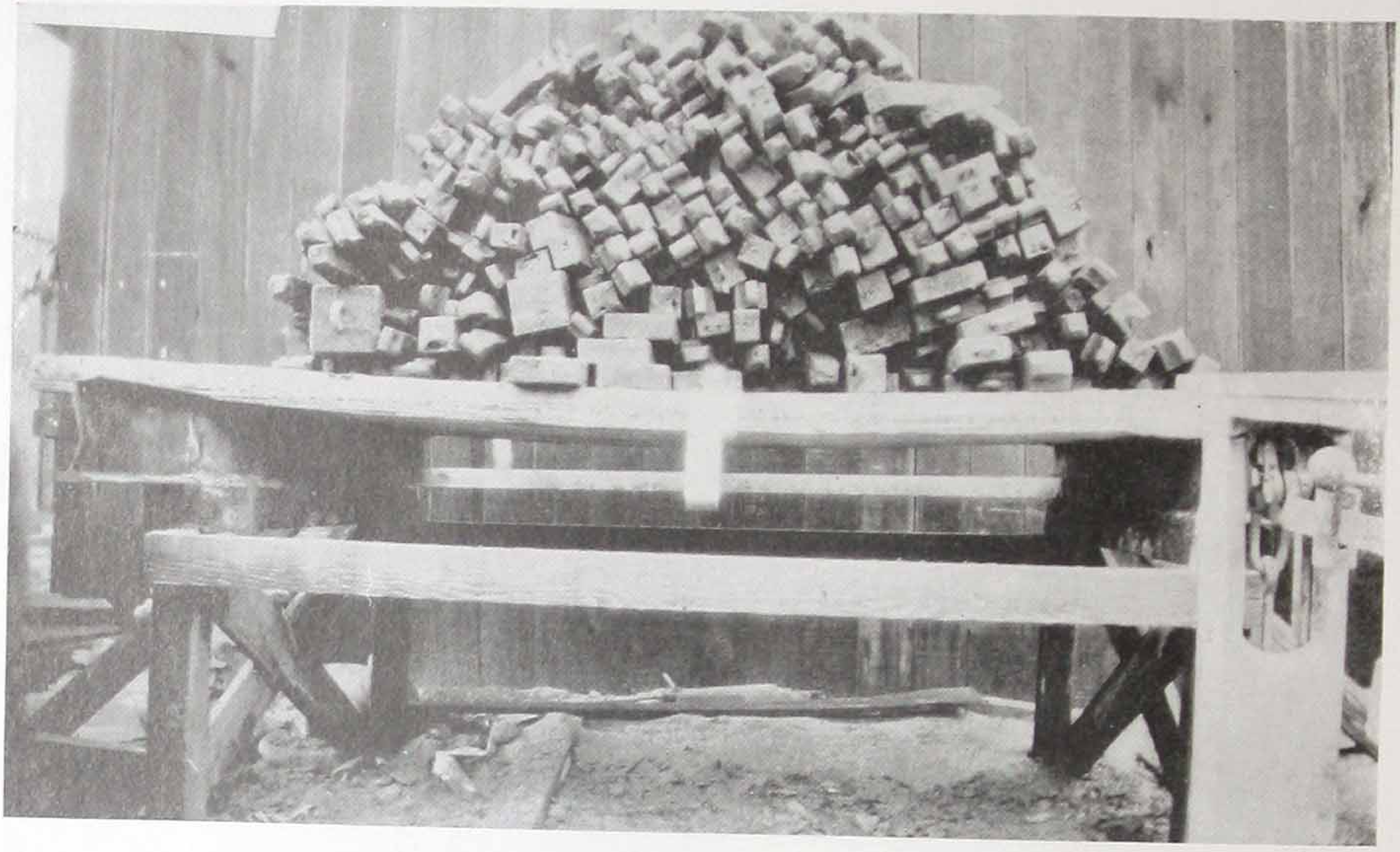
The fire was allowed to burn for 2 hours with a temperature averaging 1849 degrees after the first half hour, and a maximum temperature of 2015 degrees. While the partition showed some deflection and a number of cracks on the outside, no smoke came through at any time, and when the door was opened there were but two small cracks on the side exposed to the fire. Water at city pressure was then turned on for 2½ minutes, and while sections of plaster of the fire side were washed off, the water did not go through the partition and it was evident that it was still in shape to resist a great deal of heat. The photo at the left above shows the outside of the partition and the one at the right, the inside, both taken after the fire.

The Cement Gun

In some localities the Cement Gun is being used for the application of cement plaster, and in a test recently made in Pittsburgh, Pa., it was proven conclusively that Self-Sentering is admirably adapted to this method.

The photograph shown here is of a part of the wall on which the test was made, and it was found that no backing such as is required with the more open mesh fabrics is necessary with Self-Sentering.

Load Test to Destruction



Photograph of Test with Maximum Load (500 lbs. per sq. ft.)
Failure began at this Point

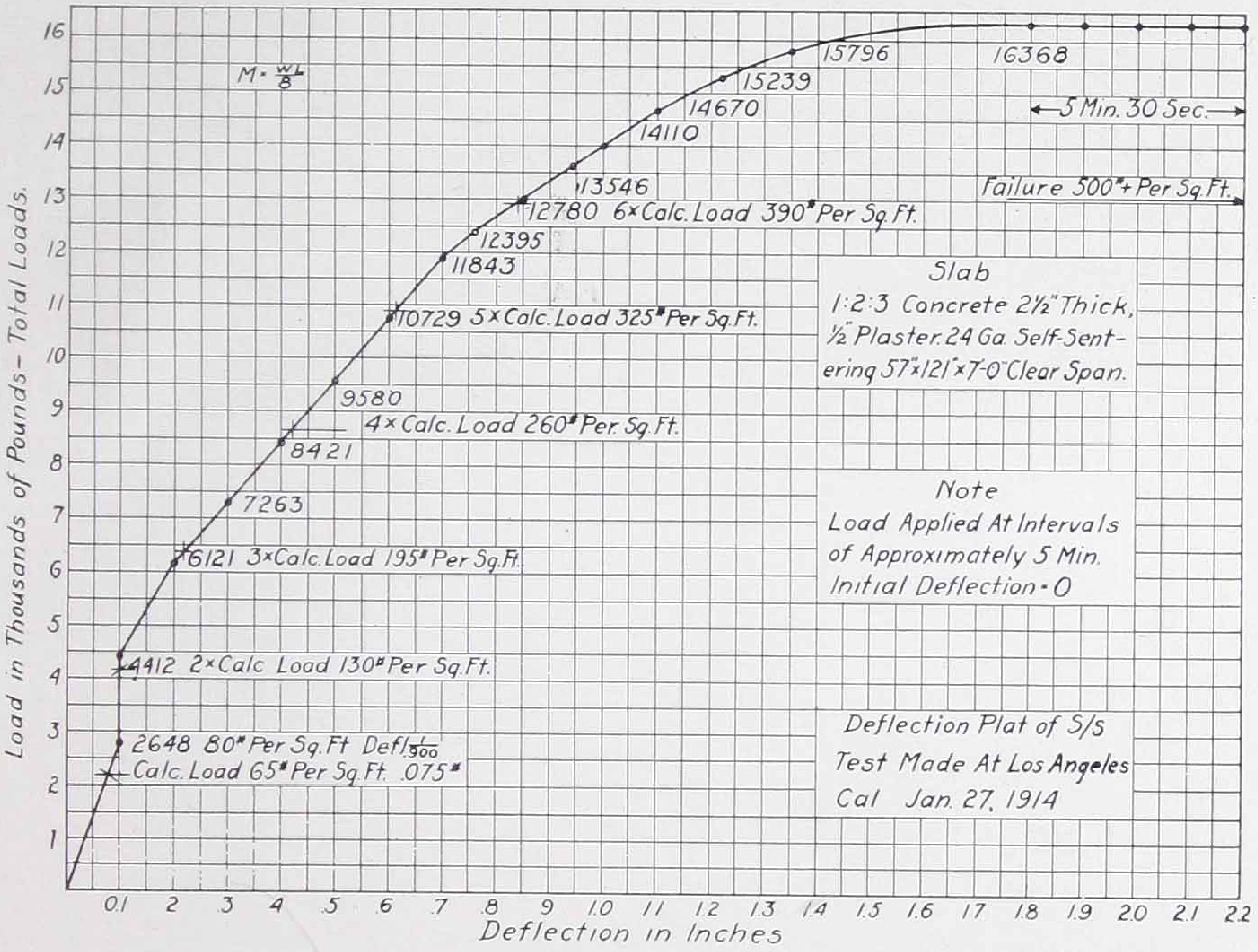
This test was conducted at Los Angeles, Cal., on January 27, 1914.

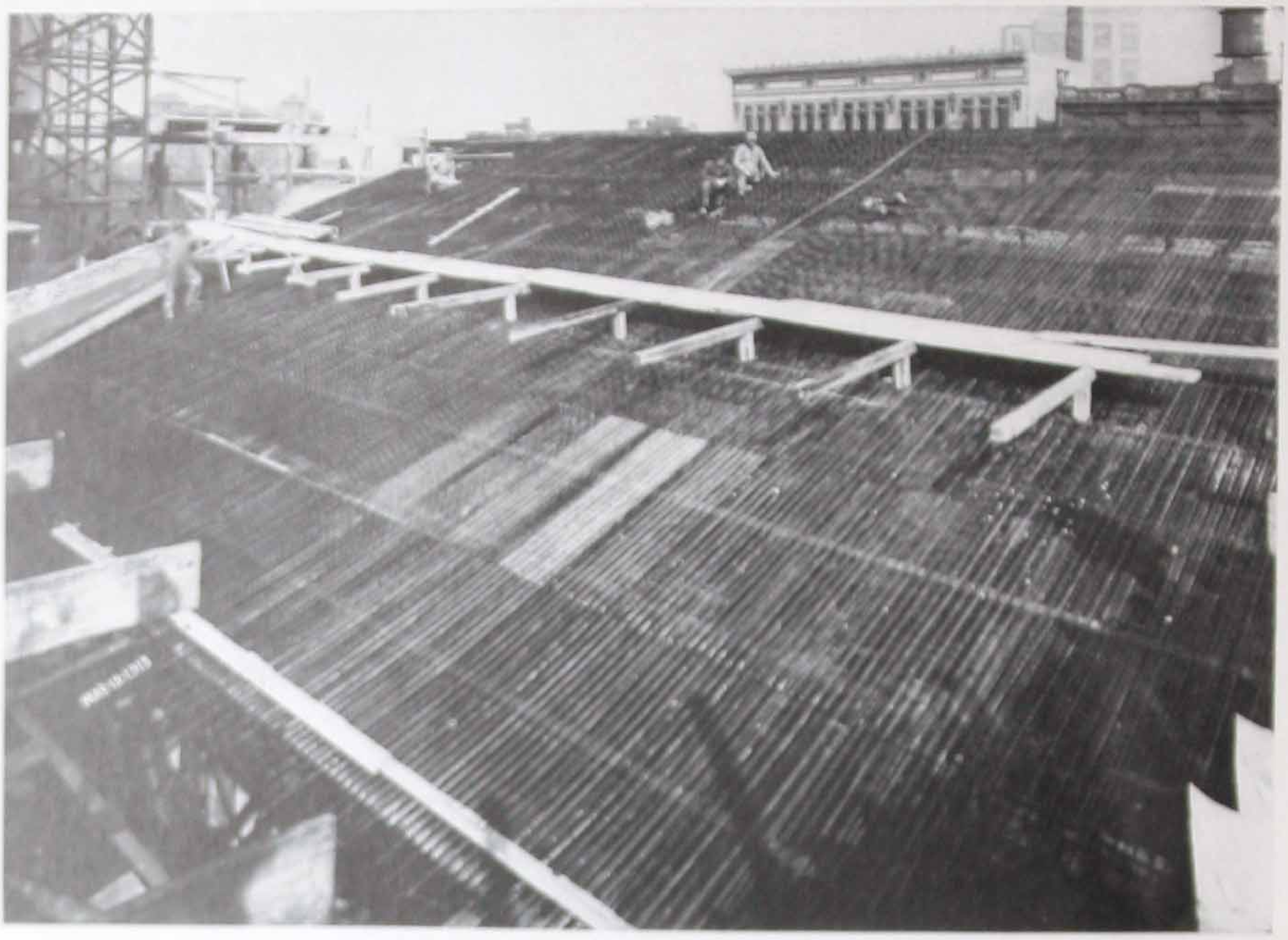
The slab was built on November 15, 1913, using No. 24 gauge painted Self-Sentering, the span being 7 feet 0 inches clear and the concrete 2½ inches thick above the mesh. The slab was 74 days old when tested and the table shown on page 19 gives an accurate reading of the deflections noted.

It will be seen that the deflection was less than 1 inch, with the slab loaded to four times the load it was calculated to carry and that failure did not occur until the slab was loaded to over 500 pounds per square foot.

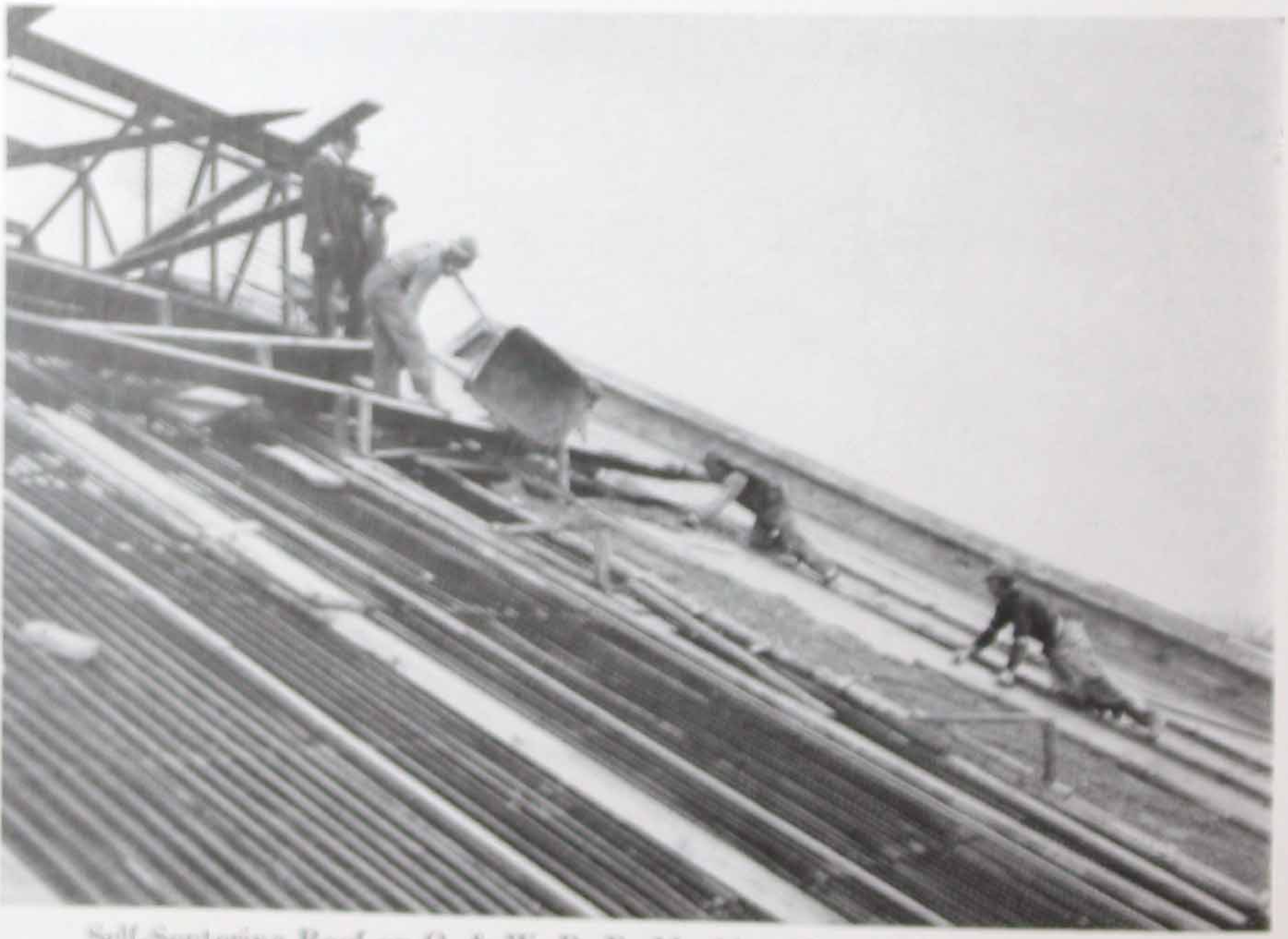
The stress in the steel immediately before failure reached over 60,000 pounds per square inch and in the concrete over 3,000 pounds per square inch at the extreme upper edge of the slab.

Los Angeles Test Chart





Self-Sentering Roof in Course of Erection on Washington Theatre, Detroit, Mich.
Architect, A. W. Johnson, New York City



Self-Sentering Roof on O. & W. R. R. Machine Shop at Argo, Washington

Self-Sentering Roofs

REINFORCED concrete makes the highest type of roof—at once fireproof and enduring, and with practically no maintenance expense. The only objections ever made to a concrete roof have been its comparatively high cost and weight. The use of Self-Sentering as both form and reinforcement overcomes both of these.

First, because no forms are required. The heavy ribs give ample rigidity to support the weight of the wet concrete.

Second, because the large sheets permit the rapid erection of such a roof with a minimum labor expense. These same large sheets require the fewest possible laps and this also increases labor efficiency.

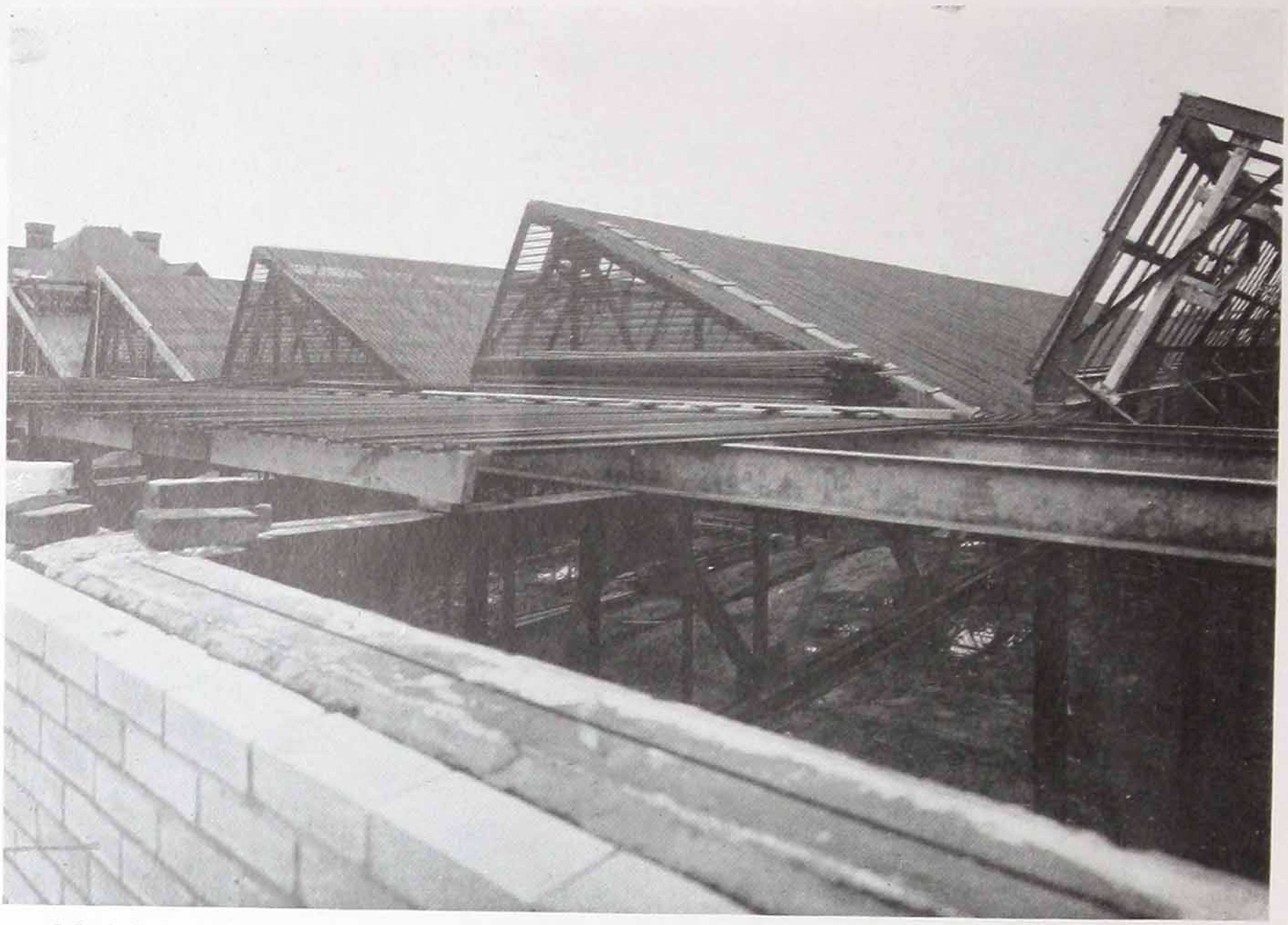
Third, because the slabs need be but 2 inches in thickness, cutting the dead load in half as compared with the ordinary concrete roof. This is not only a saving in labor and material on the roof itself, but very often permits the use of much lighter supporting framing.

Though Self-Sentering Roofs are comparatively light, a study of the Safe Load Tables given on page 11 will show that their strength is far in excess of all roof requirements.

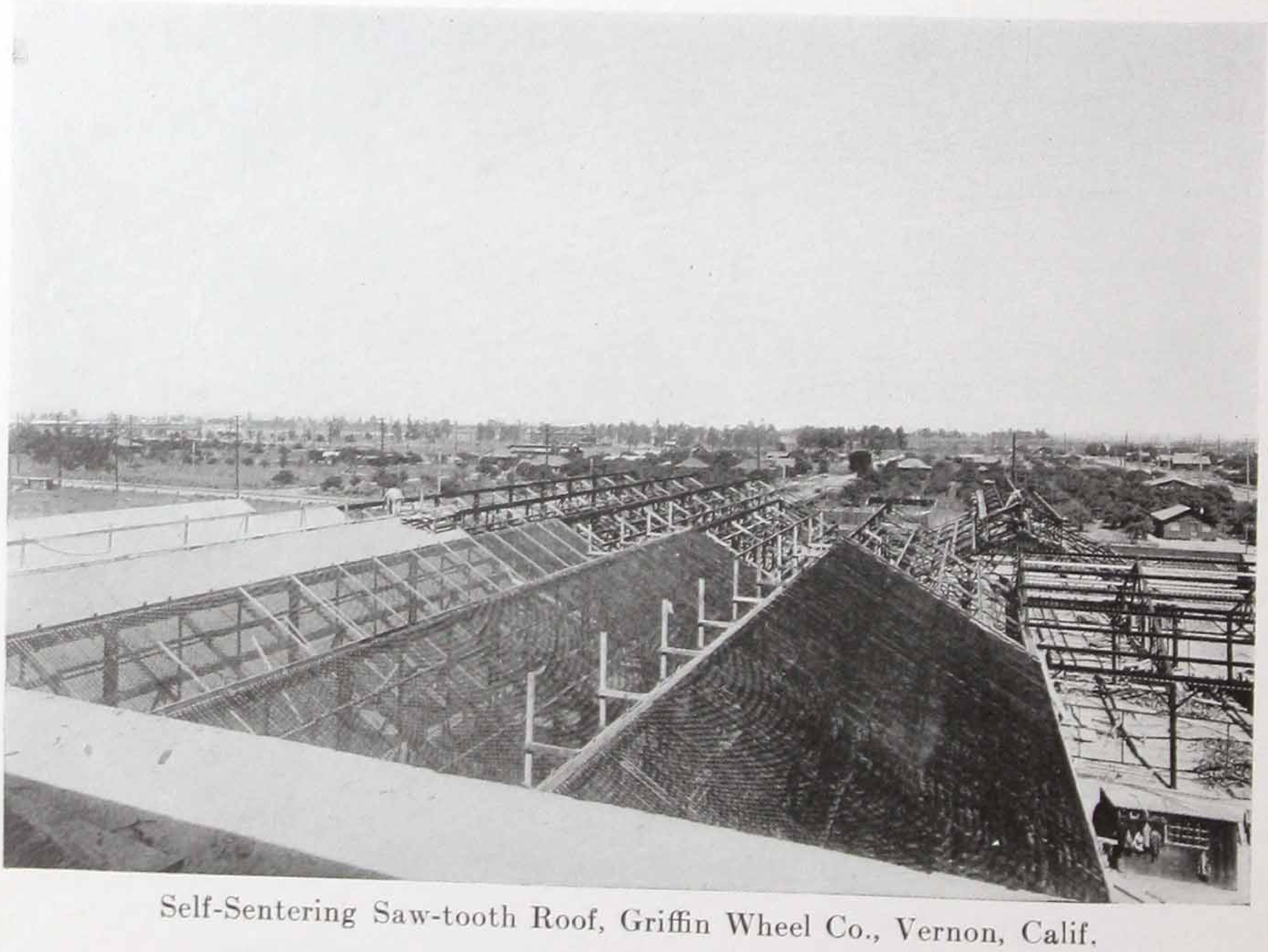
Self-Sentering Roofs are particularly adapted to steel frame buildings, but they are used economically and effectively on wood or concrete framing as well. The sheets are merely laid over the roof purlins, attached to them securely by clips, wire, nails or staples and the concrete applied to the required thickness. Only enough passes through the mesh to thoroughly imbed the steel. The underside is then plastered with cement mortar and the roof is complete, ready for waterproofing.

Self-Sentering opens up a comparatively new field for concrete roofs, namely, on buildings where pitched roofs are desired. Heretofore pitched roofs of concrete have not been considered practicable as there was no economical method of keeping the concrete in place on the inclined surface until it had set. Self-Sentering, in addition to acting as form and reinforcing, also gives a bond for the concrete so that it is readily used on roofs of any character—pitched roofs, domes, saw-tooth or flat—and at practically the same cost for one as for the other.

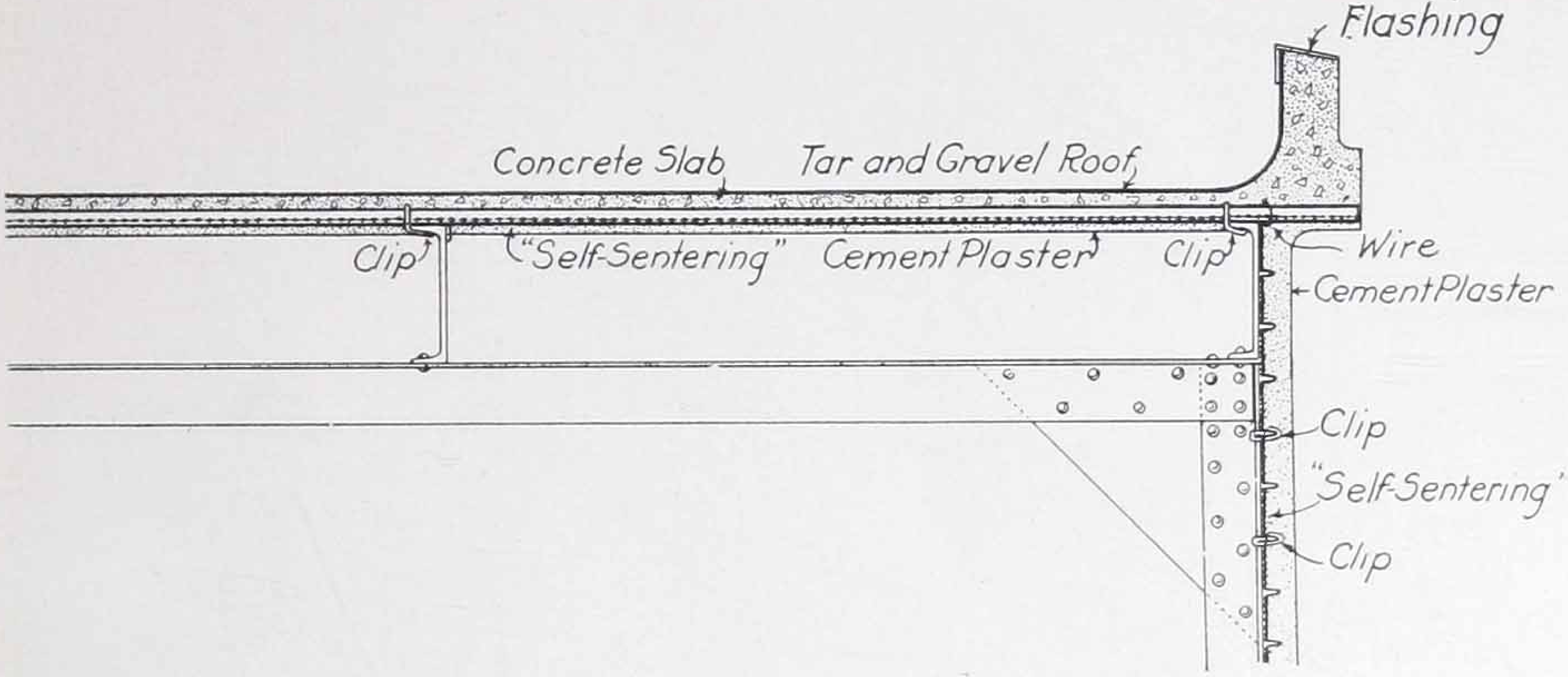
Self-Sentering allows such a diversity of roof construction that it has considerable architectural value and as a result it is being used on buildings where concrete roofs were formerly never even considered. For complete specifications, see pages 29 and 31.



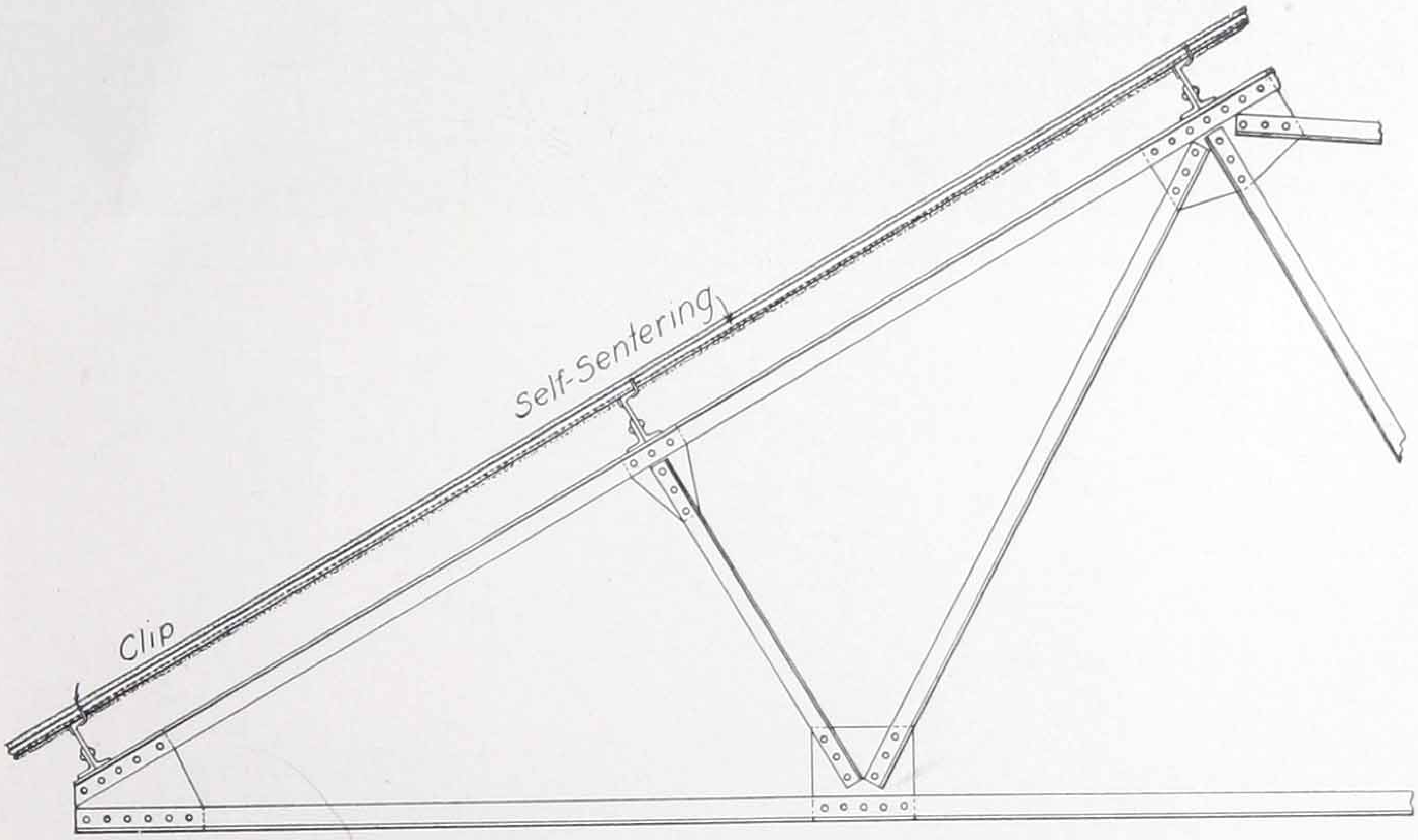
Model Gas Engine Plant, Pittsburgh, Pa. 66,000 Square Feet Self-Sentering for Saw-Tooth Roofs. J. C. Baxendall, Contractor, Pittsburgh, Pa.



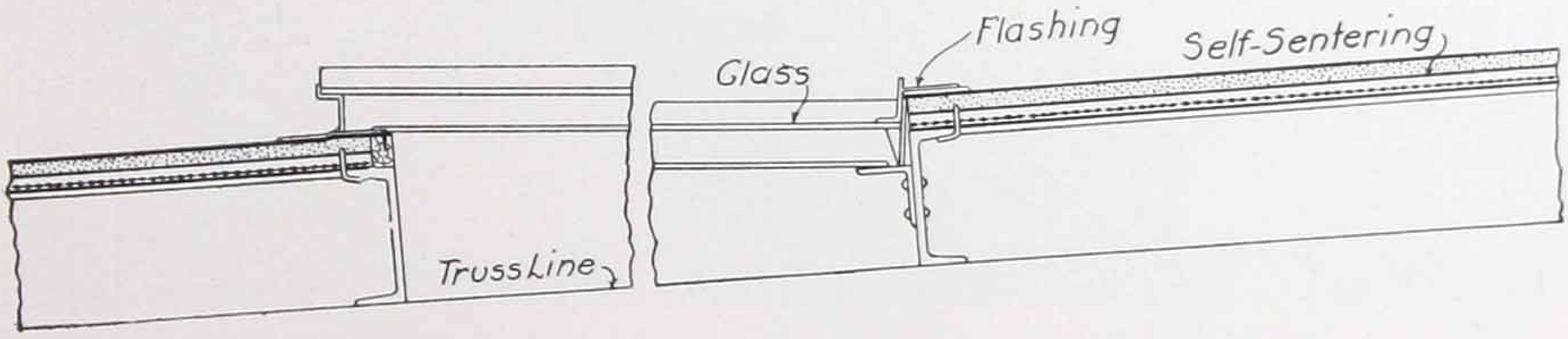
Self-Sentering Saw-tooth Roof, Griffin Wheel Co., Vernon, Calif.



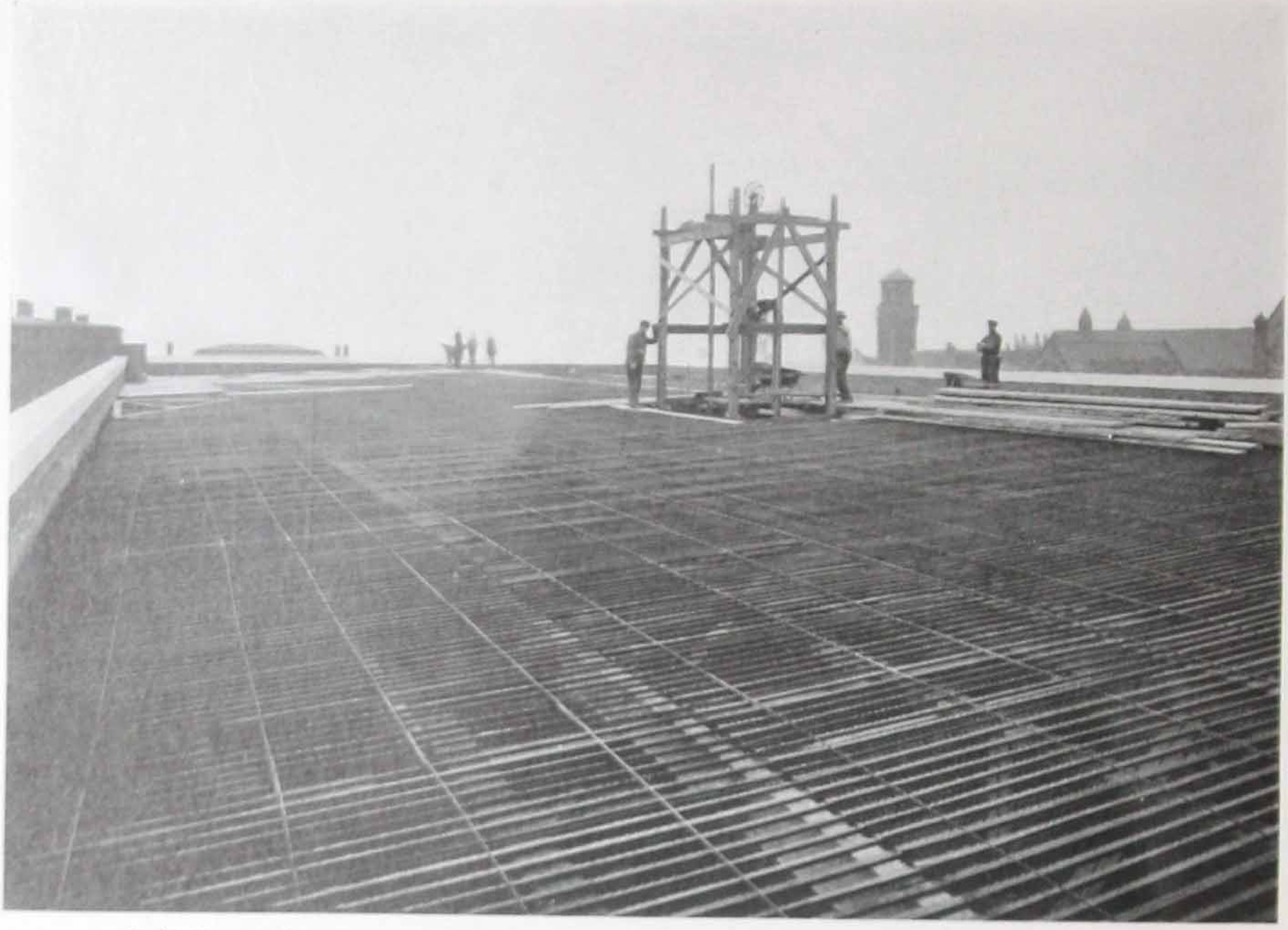
Detail at Eaves of Flat Self-Sentering Roof. Side Walls also Reinforced with Self-Sentering



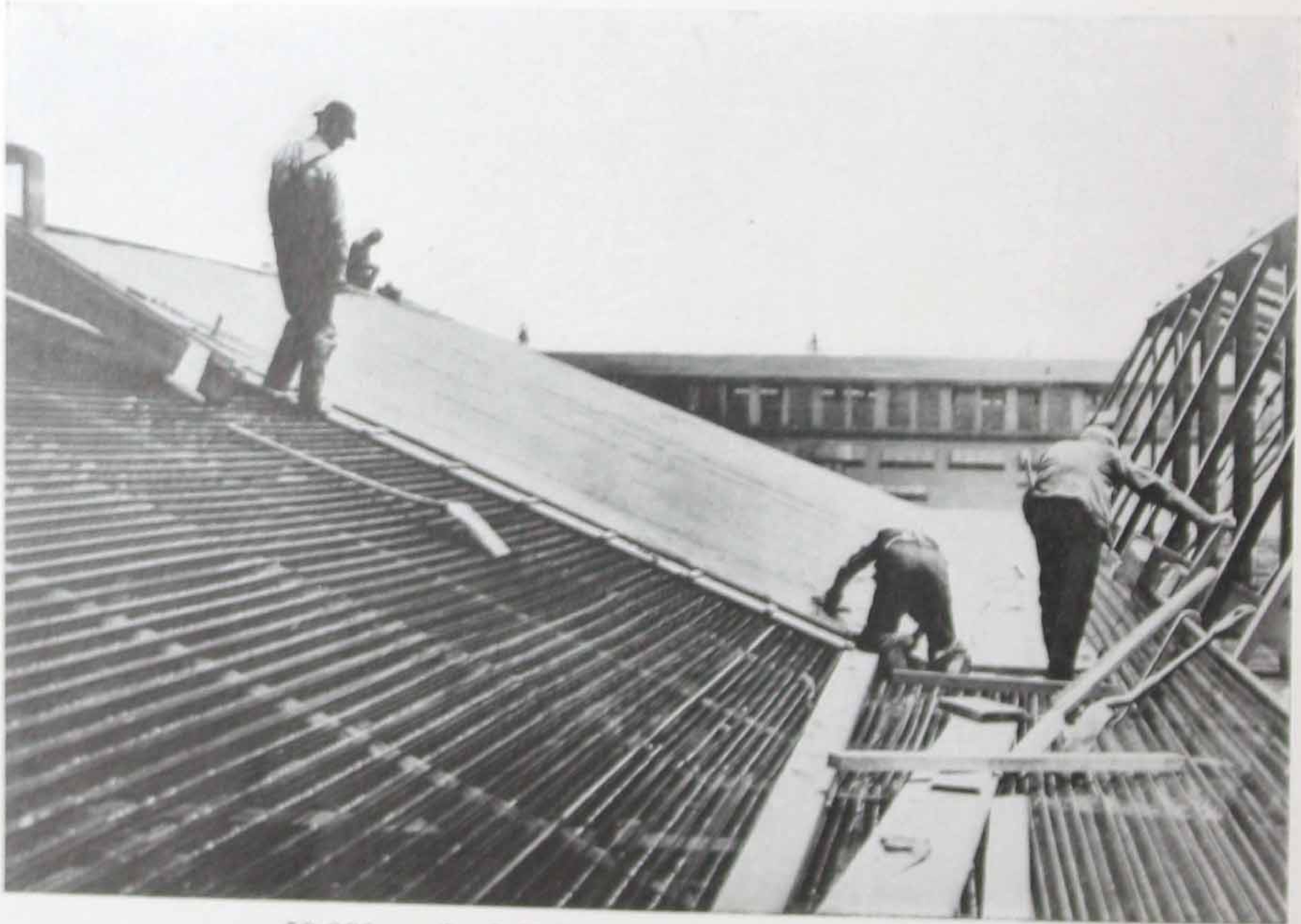
Detail of Ordinary Pitch Roof on Structural Framing. Self-Sentering Attached to Steel Channels with No. 5 Clips



Detail of Skylight in a Self-Sentering Roof



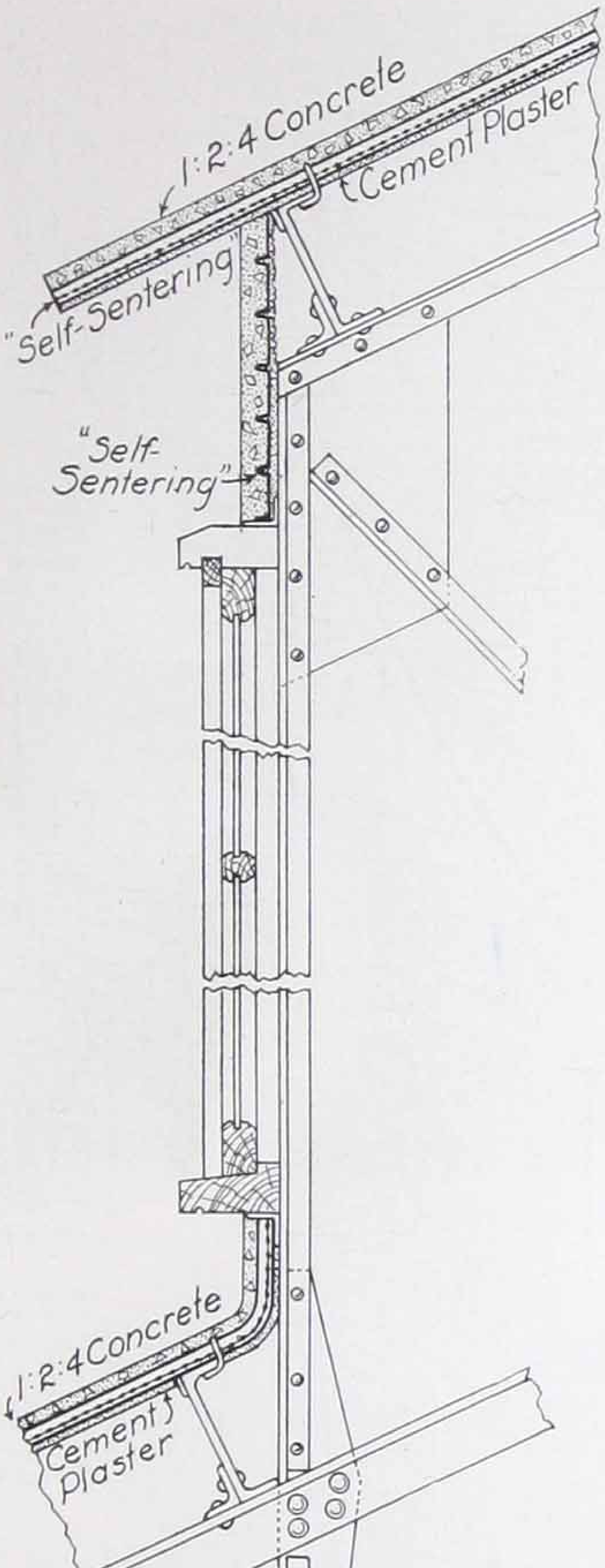
Self-Sentering Roof, High Pressure Pumping Station, Cleveland, Ohio



50,000 sq. ft. Self-Sentering Roof for Fairbanks, Morse & Company, Beloit, Wis.

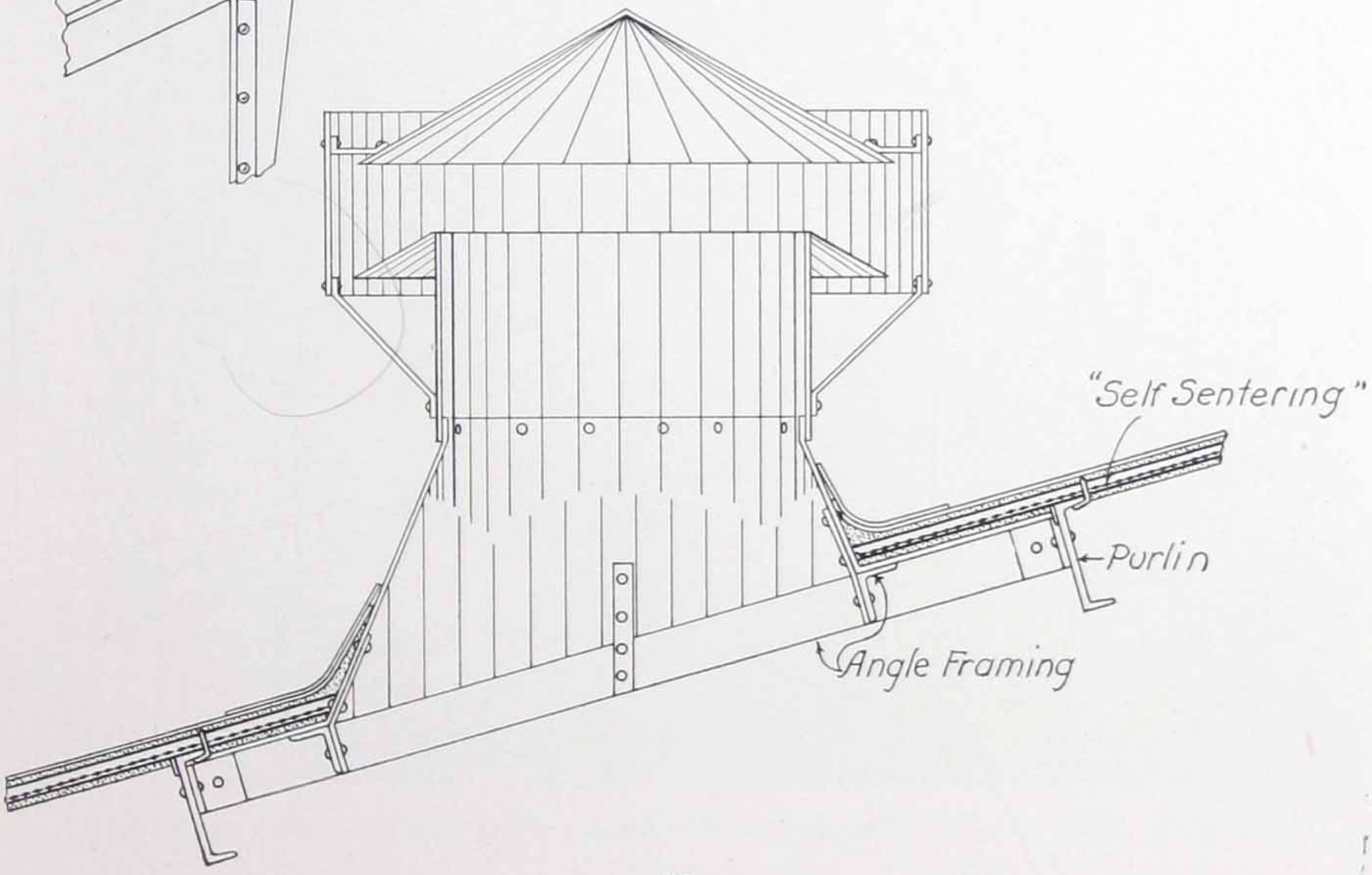
Monitor Roofs

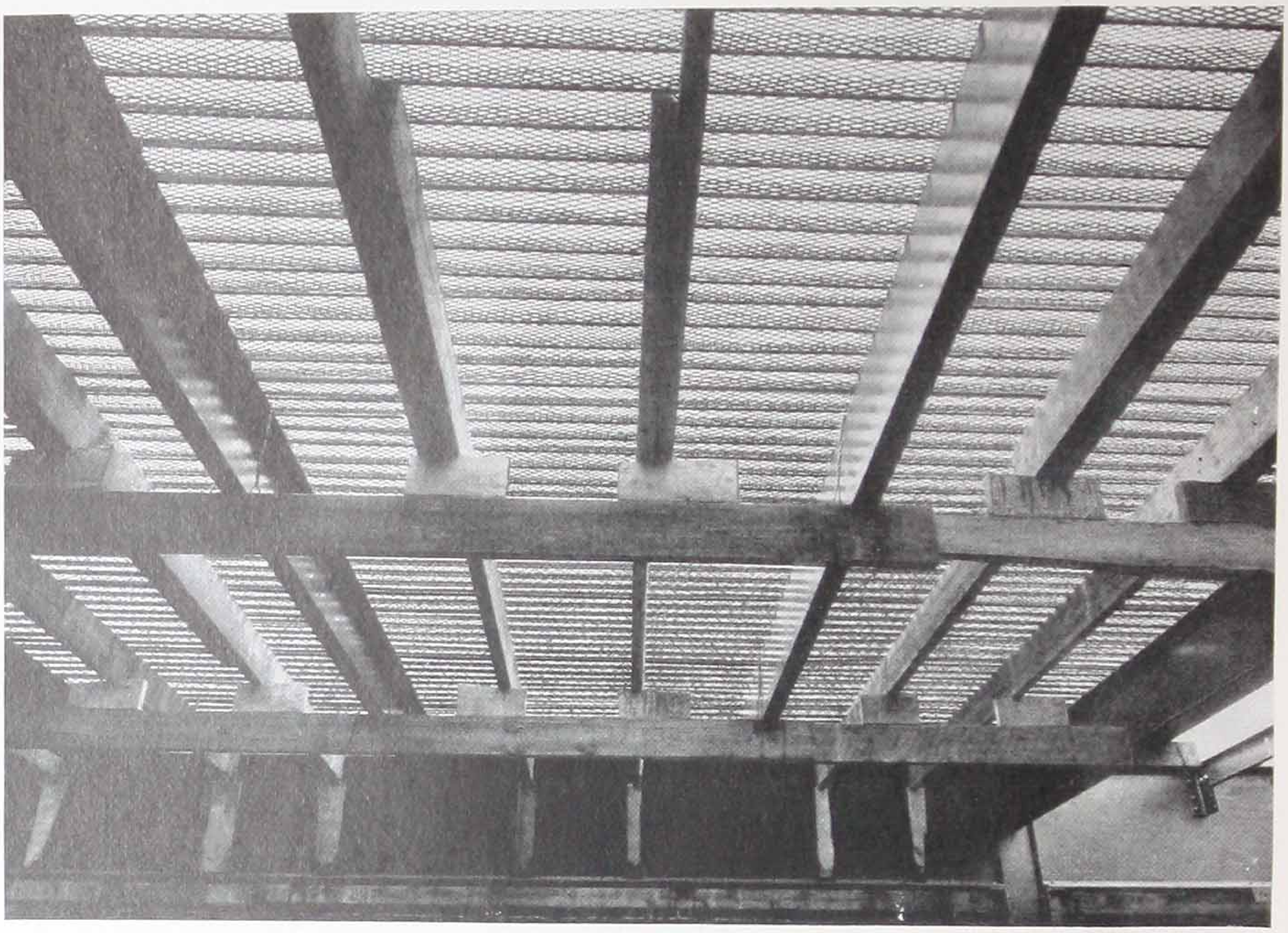
Self-Sentering Used for Both Roof and Walls



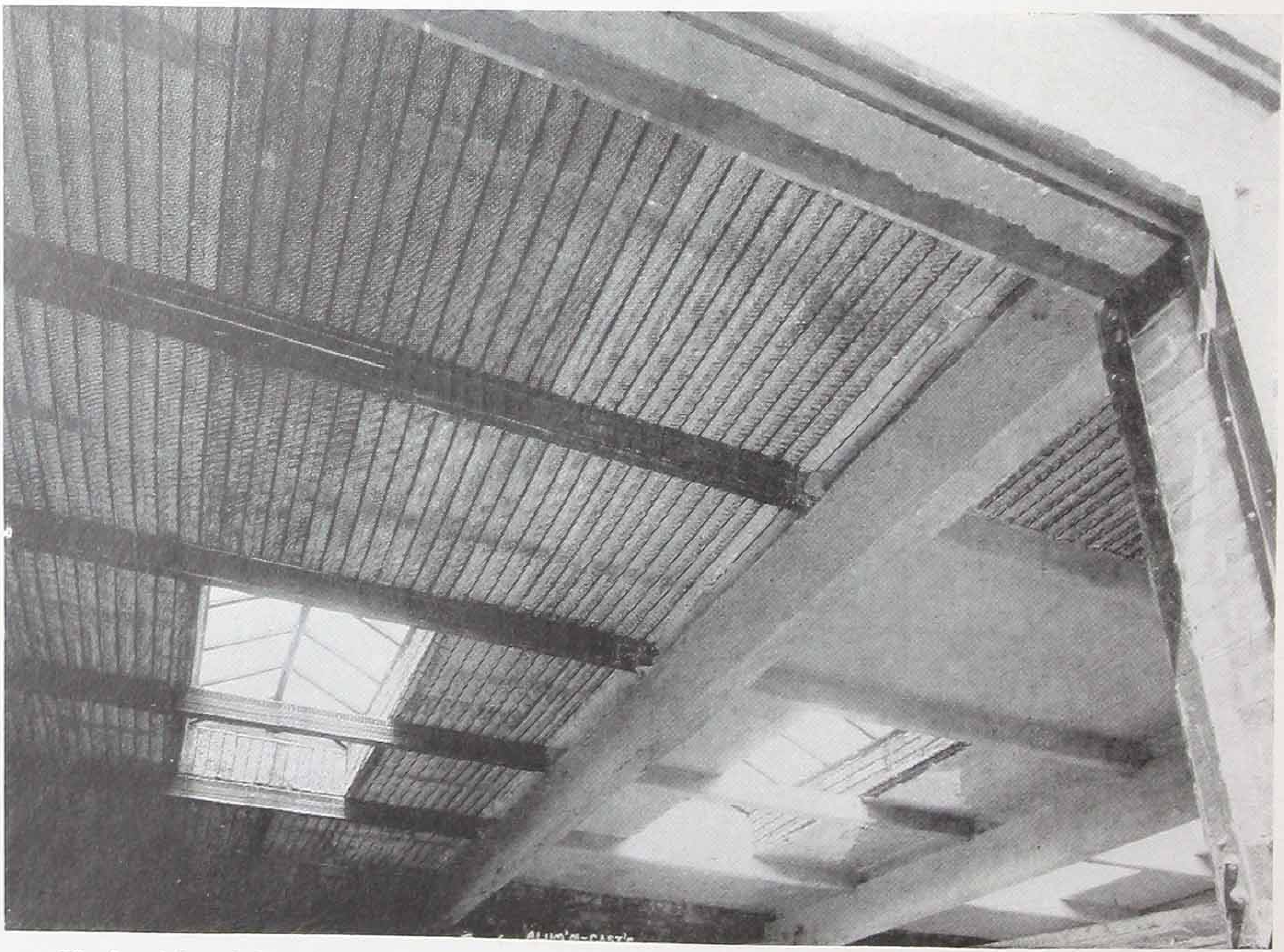
Detail of Ventilator

As Applied to Self-Sentering Roof

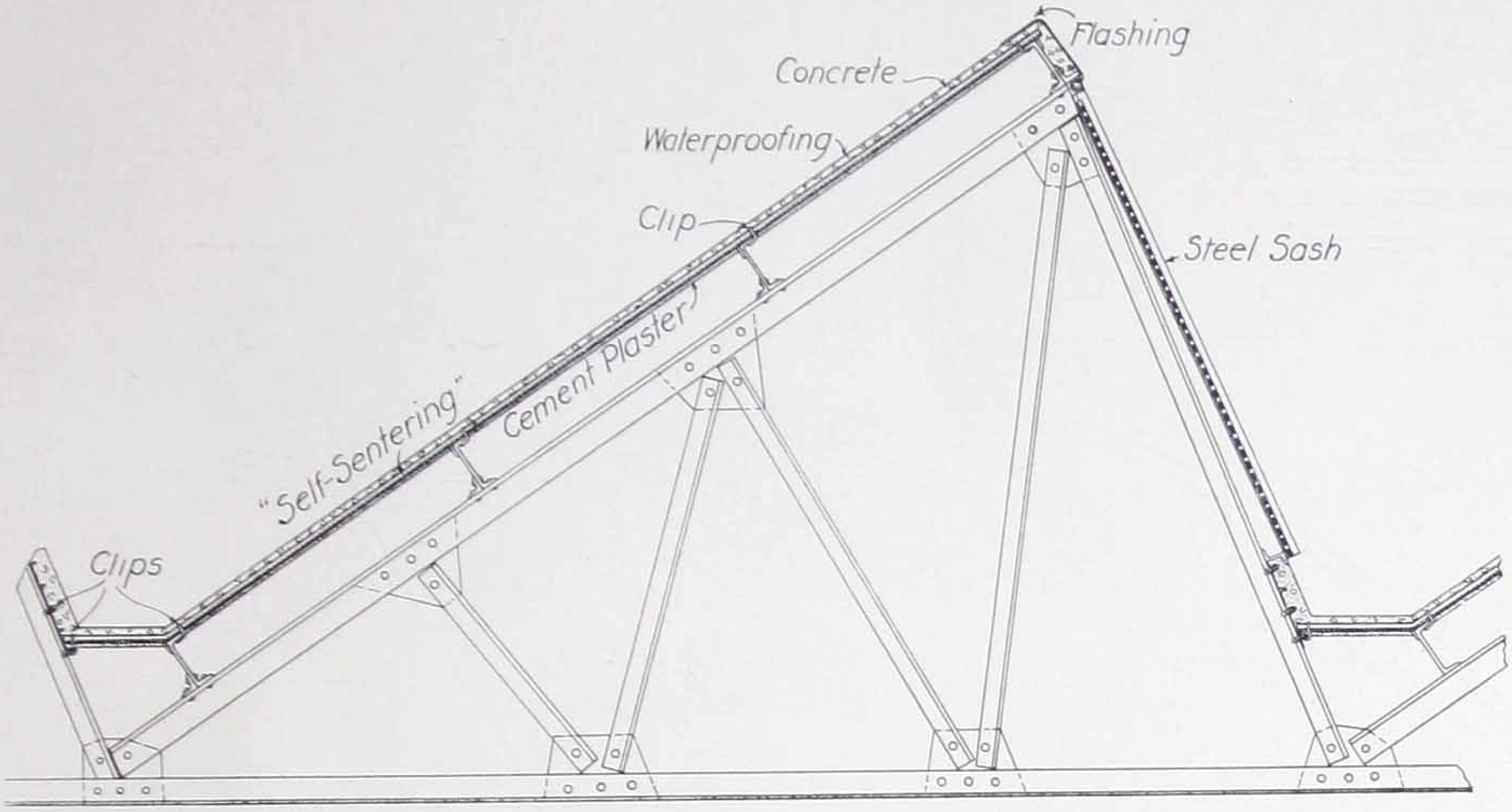




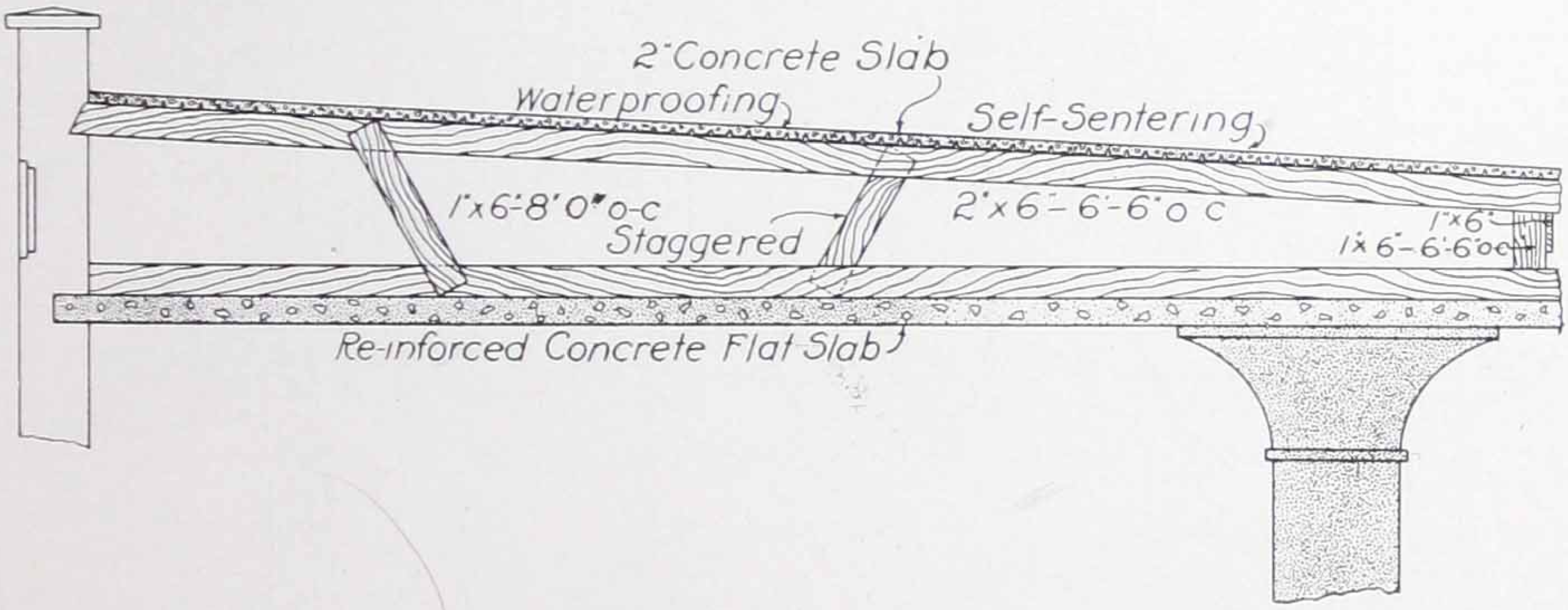
Extreme Simplicity of Erecting Temporary Supports on Long Spans



Underside of Roof before Plastering, Aluminum Castings Co., Cleveland, Ohio



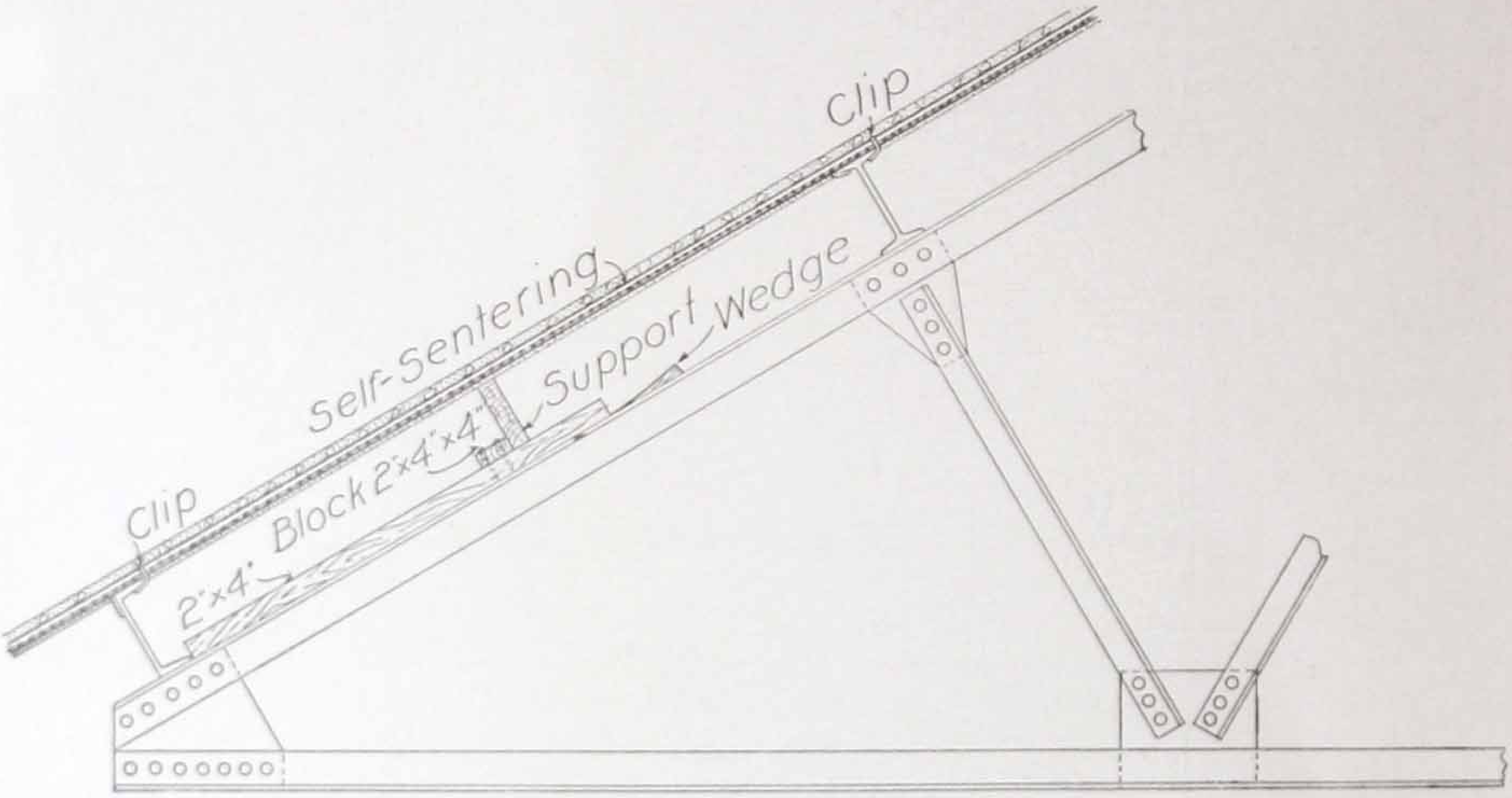
Detail of Self-Sentering Saw-tooth Roof



A Self-Sentering Roof Used in Connection with
Flat Slab Construction

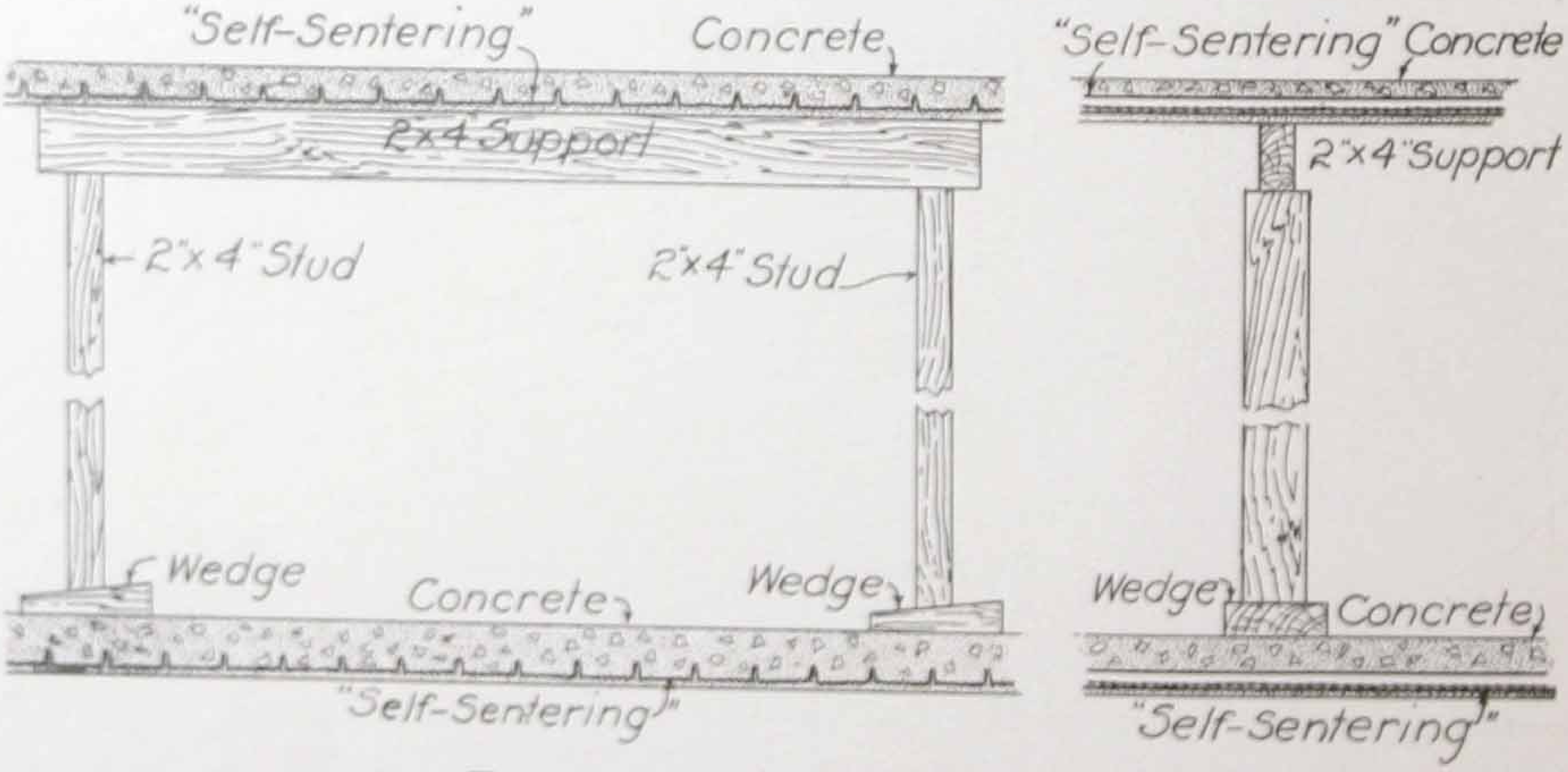
The type of roof shown in the lower detail is used in reinforced concrete construction of the flat slab type. Where ordinarily a cinder fill is used to obtain the necessary pitch, the Self-Sentering work is built up to the desired pitch on a wood framing. In a large roof this eliminates many complications resulting from the uneven loading of the roof by cinder fill formerly used.

Methods of Erecting Temporary Supports Required on Long Spans



Temporary Supports on a Pitched Roof

If spans between trusses are too long to be spanned by 2 x 4-inch support shown, intermediate supports may be placed between purlins, resting on the lower flanges or supported by wires as shown on page 26



Temporary Supports on Flat Roof

This method of erecting supports, where story height is not too great, will often be found simpler and more economical to erect than by attaching supports to purlins and trusses

Self-Sentering Roof on Stock Yards Inn, Chicago, Ill. Underside Plastered With Cement Gun. Architect, R. S. Lindstrom

Roof and Floor Specifications

Self-Sentering, with heavy ribs 3⅝ inches center to center (manufactured by The General Fireproofing Co., Youngstown, Ohio), to be used on all concrete roofs and floors as indicated on plans.

The Self-Sentering to be rigidly attached to supporting members by special clips supplied by the manufacturer or by tie wire (No. 14 gauge preferred).

(Note: See Safe Load Tables for gauge of Self-Sentering and thickness of slab for various spacing of supports, page 11.)

The clips or tie wire, securing the Self-Sentering to the supports, to be spaced not more than 7¼ inches apart, i. e., one clip at every other rib at each bearing point and clamped so that the Self-Sentering is firmly held in place.

The side ribs of Self-Sentering sheets to interlock and be securely fastened together by clinching with a special punch; the ends to lap at least 2 inches where lap comes over support and not less than 8 inches if laps occur between supports. Where sheets lap between supports, ends of adjoining sheets to be securely fastened together by punching or wiring.

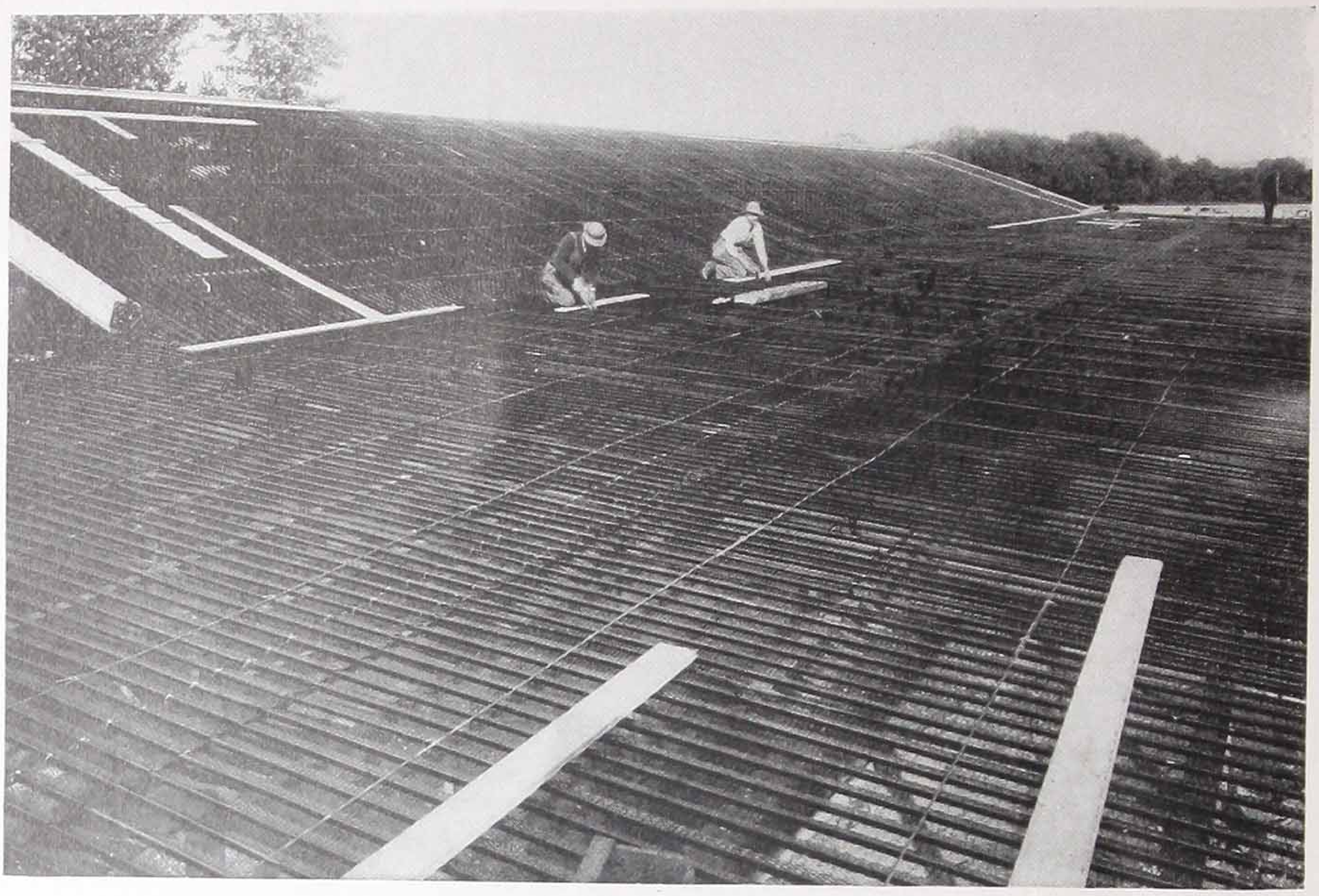
(Note: Sheets may often be fastened together on the ground, by clinching the side ribs, rolled up and hoisted into place five or six at a time.)

Concrete

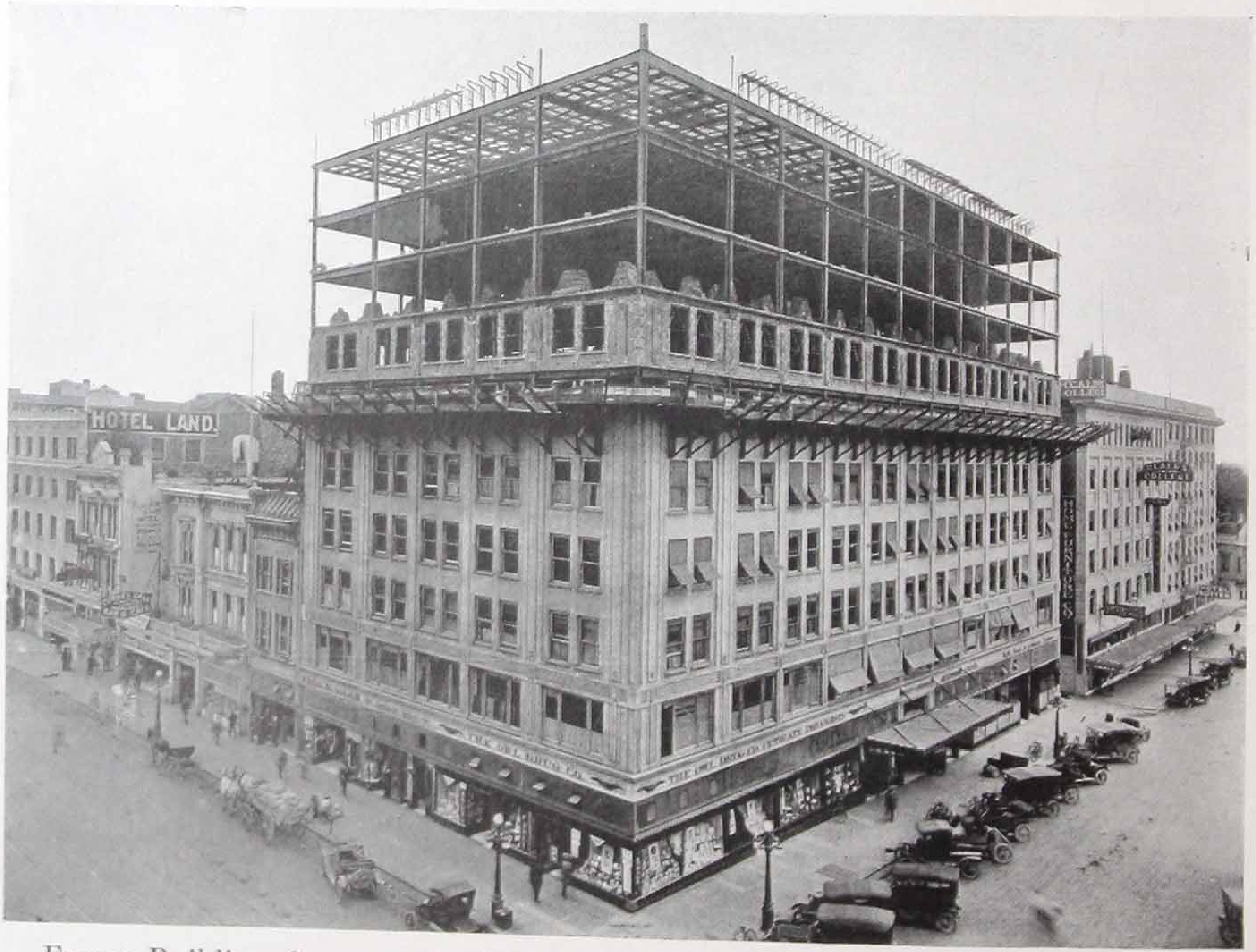
Proper planking to be provided so that the weight of workmen will not be borne by Self-Sentering.

The slab to consist of two coats, one to be applied on top of the Self-Sentering and the other on the bottom.

The upper coat is to be applied first and to consist of a mixture of one part Portland cement, two parts of clean, sharp sand and four parts of fine gravel or crushed stone to pass a ½-inch screen and of a consistency which will permit the concrete to key through the mesh of Self-Sentering without waste by dripping. Top to be floated smooth to receive waterproofing.



Self-Sentering Roof on Frost Wire Fence Co. Plant, Cleveland, O.
Architects and Engineers, Prack & Perrine, Toronto, Ont.



Forum Building, Sacramento, Calif. Self-Sentering used for four floors and roof
Architect, R. A. Herold

(Note: The depth of concrete above the mesh of Self-Sentering to depend upon the thickness of slab required. See Safe Load Tables.)

Concrete batches to be deposited over supports and spread towards center of span.

When the upper coat has thoroughly set, the under coat shall be plastered to a thickness of ½ inch below the Self-Sentering.

This coat consists of a mixture of one part Portland cement (gauged with 1-10 its volume of lime), 2½ parts clean, sharp sand, with the addition of a small amount of hair to assist adhesion.

Expansion Rods

(Note: Required on all exterior jobs, recommended for floors as well.)

Round rods having a sectional area of .03 square inches, shall be placed 30 inches on centers on top of the heavy ribs and at right angles to them to take up expansion. (Note: The manufacturers of Self-Sentering can furnish a special No. 5 rod .207 inches in diameter for this purpose.)

Waterproofing

(For Roofs.) After the concrete has set an approved brand of waterproofing to be applied. (Full information given in GF Waterproofing Handbook.)

With Wood Beams

Where supporting members are of wood, suitable wire staples (1½ inch, No. 10 gauge galvanized with a ¾-inch spread preferred) to be used to secure the Self-Sentering in position. Self-Sentering sheets to be stapled to supports not more than 7¼ inches apart, i. e., one staple to every other rib at each bearing point.

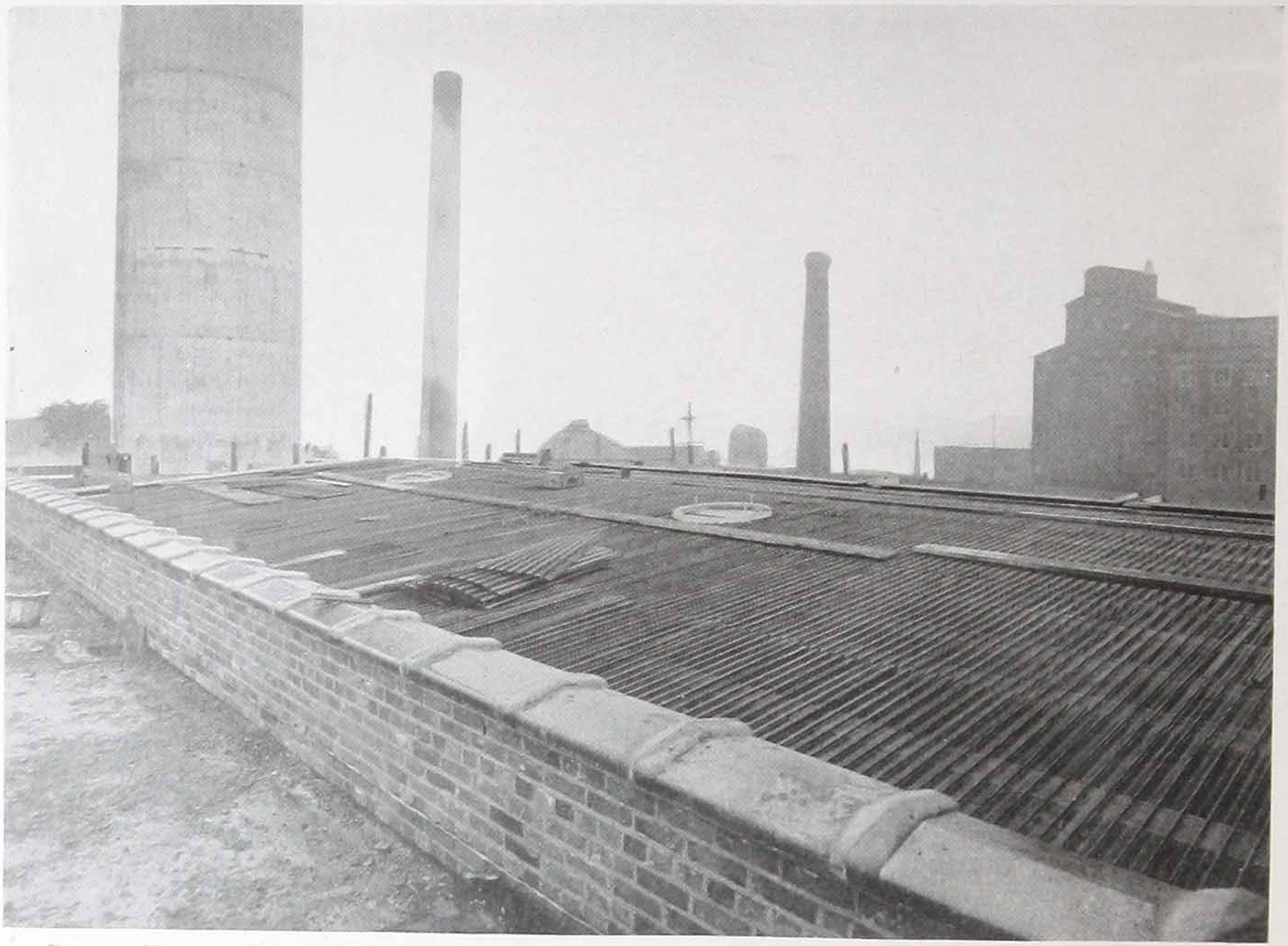
Sheets to be fastened together, concrete applied and underside plastered as on steel construction.

Mosaic or Terrazzo Floors over Wood Joists

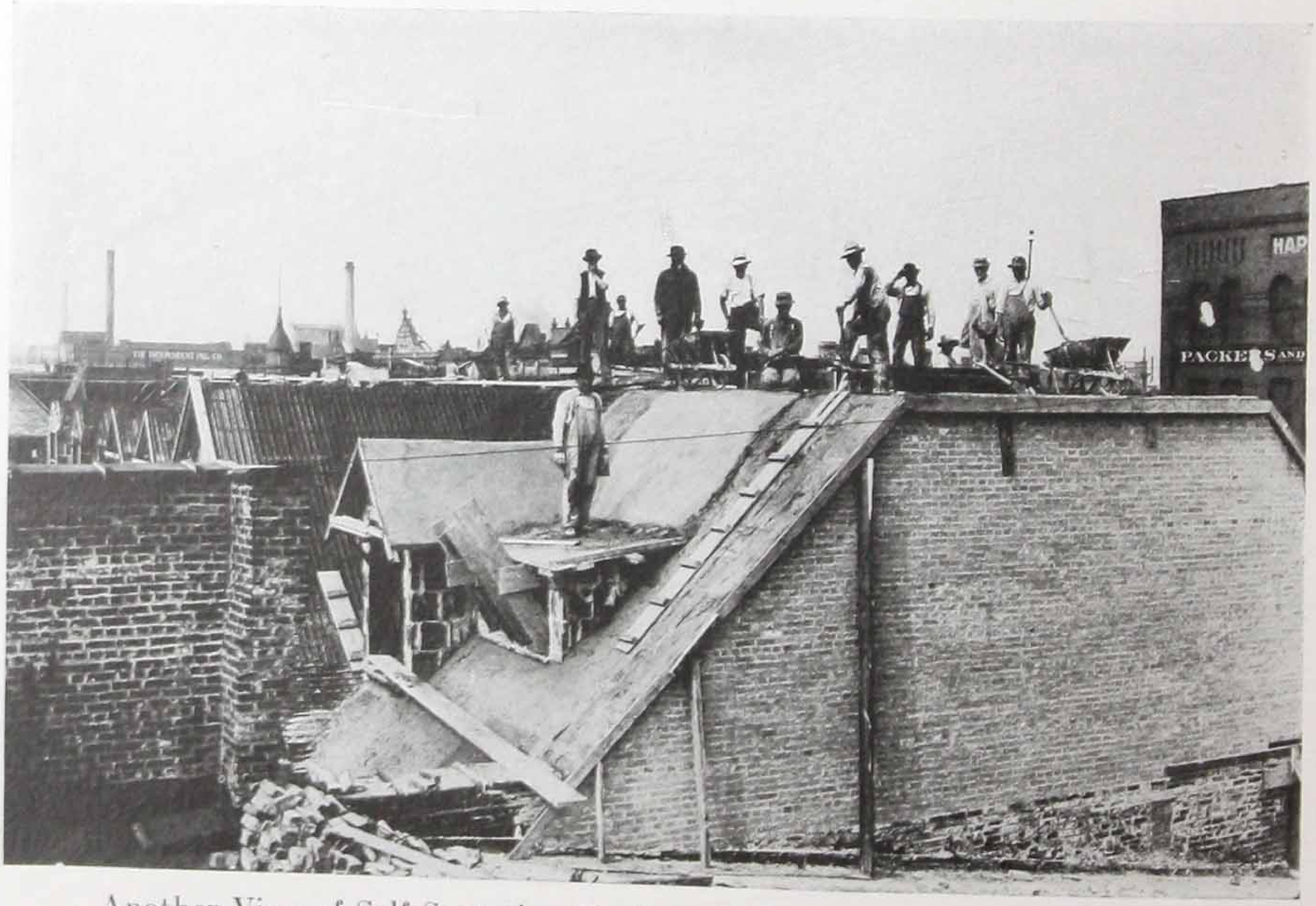
Over wooden joists to be laid one layer of black waterproof building paper. Over this 28 gauge Self-Sentering with ribs up and across the joists. On this to be placed 1½ inches of concrete to consist of one part Portland cement, two parts clean, sharp sand and four parts rock having a maximum dimension of 1 inch. Concrete to be thoroughly mixed and applied as a wet mixture. Wooden screeds 1½ inches thick to be laid, at intervals, in the mesh so concrete can be screeded off to an accurate thickness and be made smooth and level, forming a base for tile, terrazzo, marble, etc.

With Concrete Beams

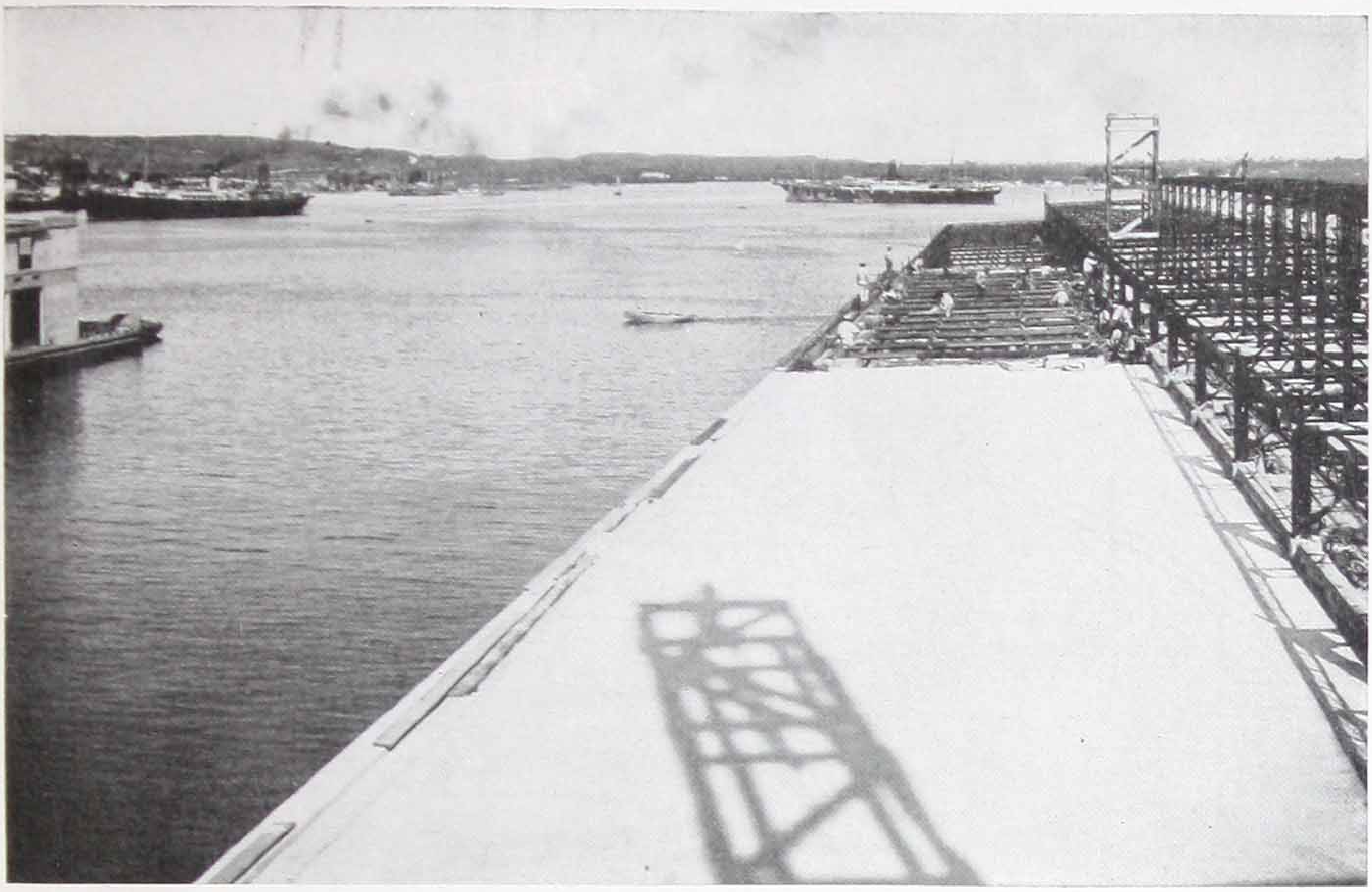
Where concrete beams are used with flat slabs, the ends of the Self-Sentering sheets shall rest on edges of beam boxes; sides of beam boxes may be wired together to save bracing. With arched slabs the ends of the Self-Sentering sheet shall rest on the bottom board of the beam box. In other respects the work shall be performed in the same manner as with structural steel framing.



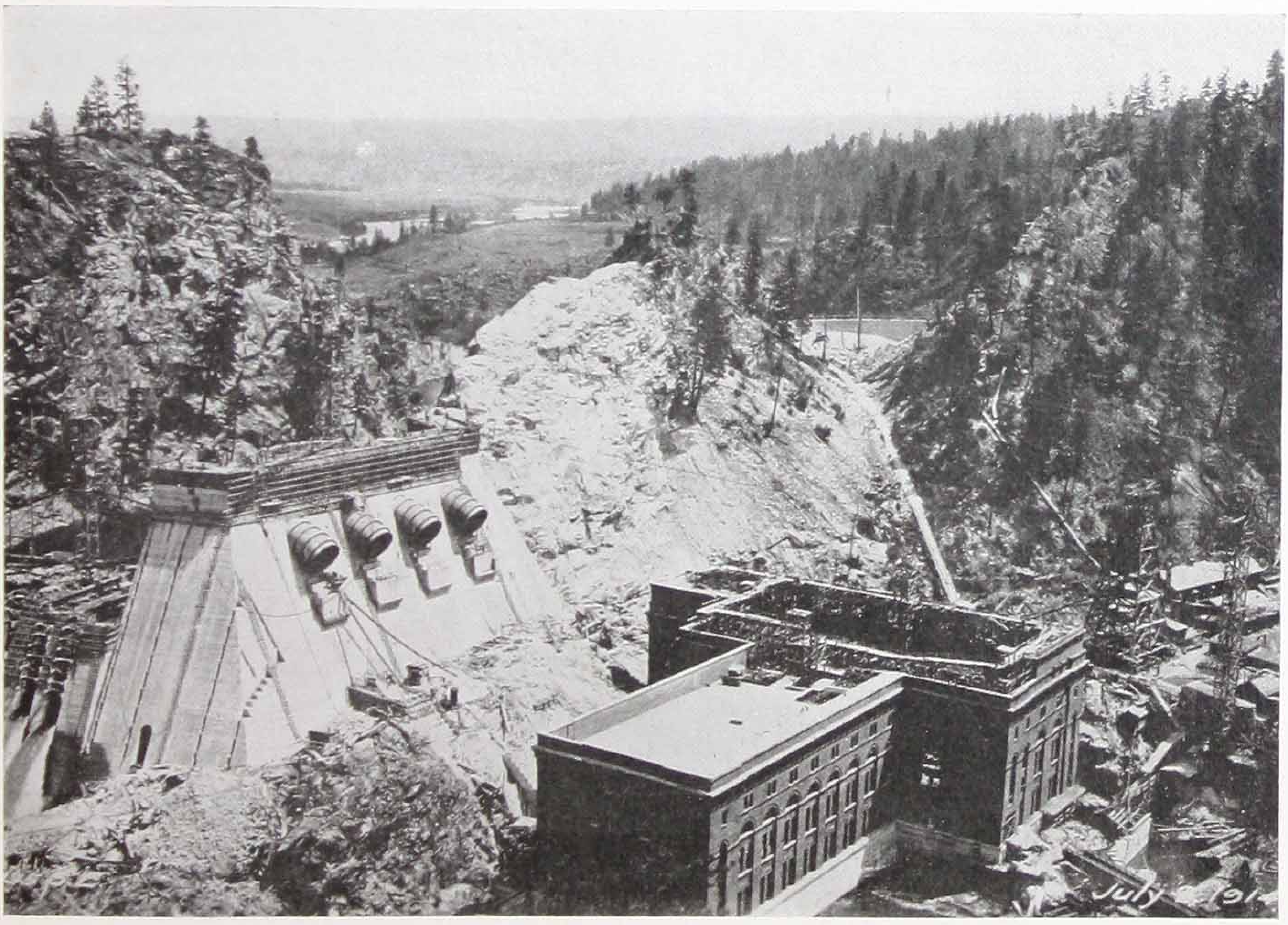
Steam Power Plant, Wisconsin-Minnesota Light and Power Co., La Crosse, Wis.
Self-Sentering Roof. Contractor, Fargo Engineering Co., Jackson, Mich.
Resident Engineer, W. C. Giffels, La Crosse.



Another View of Self-Sentering Roof on the Stock Yards Inn at Chicago,
Showing Application of Concrete to Sharply Inclined Surfaces



Municipal Wharfs, Havana, Cuba
90,000 ft. Self-Sentering used for Roofs of Pier Sheds
Barclay, Parsons & Clapp, Engineers. McArthur, Perks & Co., Ltd., Contractors



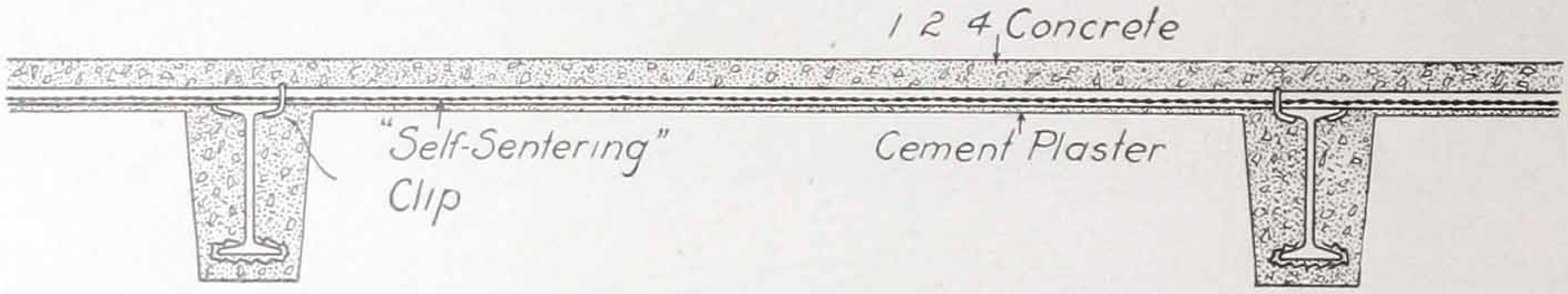
Long Lake Plant, Washington Water Power Co., Springdale, Wash.
Self-Sentering Roofs and Floors. Trussit Side Walls for Generator Room
Designed by Carl F. Uhden

Self-Sentering Floors

SELF-SENTERING makes a most economical type of fireproof floor, which can be readily adapted to any type of building. It can be used on wood, steel or concrete beams. The construction is very similar to roof work, except that, of course, it must be heavier to conform to the loads carried. The various types of floors shown herewith have each their individual merits, but they are uniform in certain respects, namely, the economy in erection—due to the absence of form work—their wonderful strength as compared with their light weight, and their absolute permanence, fireproofness and sanitary features.

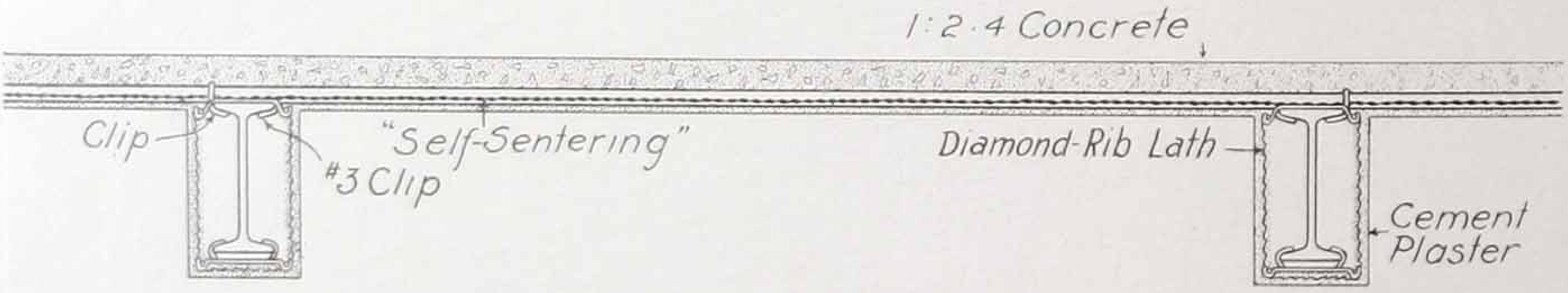
The concrete floor has proved itself the most enduring type and, as in roof work, its only objection has been high cost and excessive weight. Through the advent of Self-Sentering, by means of which the most expensive part of such work—form work—has been eliminated, the cost has been reduced to compare very favorably with any other type. The use of the lighter slabs required by Self-Sentering has cut the weight to a minimum and yet the strength of these floors is unquestioned. There is no danger from failure due to premature removal of forms, as Self-Sentering, acting as both form and reinforcement, is always in place.

Self-Sentering Floor—Type No. 1



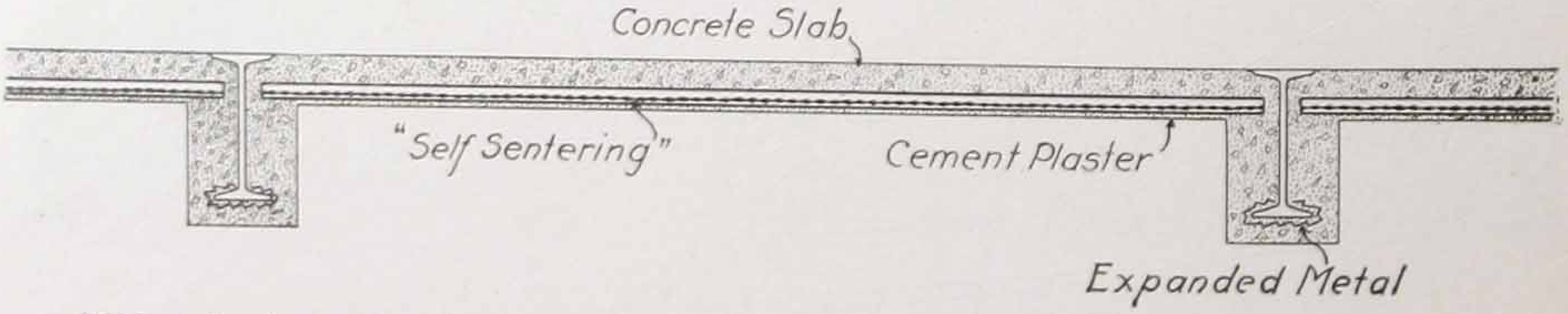
Self-Sentering is attached direct to steel beams by clips as shown on page 10, concrete applied to the desired thickness and the underside plastered with cement mortar. Sides of beam boxes are wired together to save bracing across the span. To permit pouring the beam haunching at the same time, punch out the mesh between the Self-Sentering ribs where they come over the beam.

Self-Sentering Floor—Type No. 2



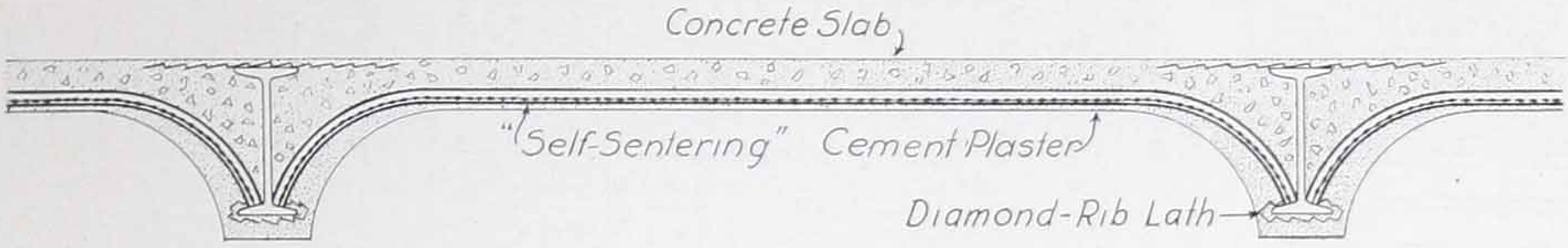
This type of floor is the same as No. 1 except that beams are fireproofed with metal lath and plastered. This can be done at the same time the underside of the slab is plastered.

Self-Sentering Floor—Type No. 3



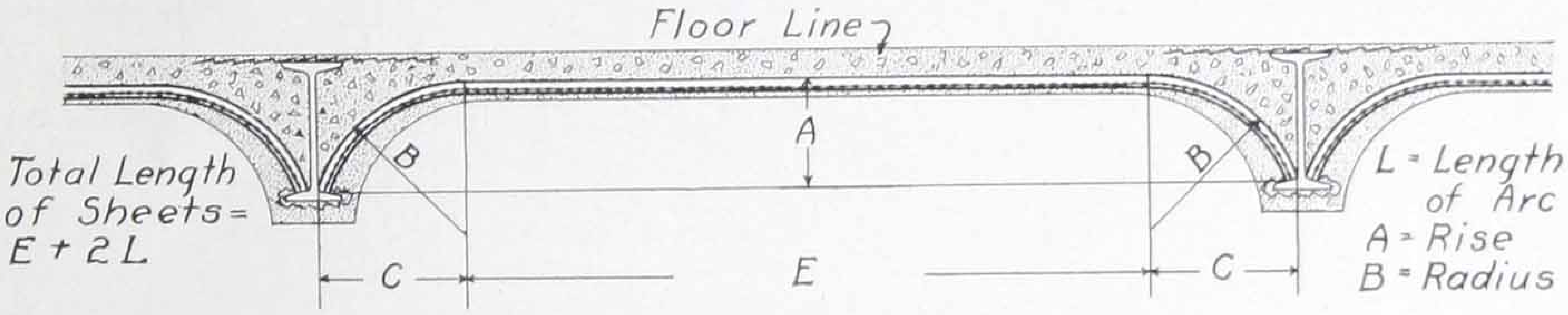
Self-Sentering sheets rest on the edges of beam boxes used as forms for the beam fireproofing. Allow slab to set flush with top of beam, giving greater headroom below. Self-Sentering acts as both form and reinforcement.

Self-Sentering Floor—Type No. 4



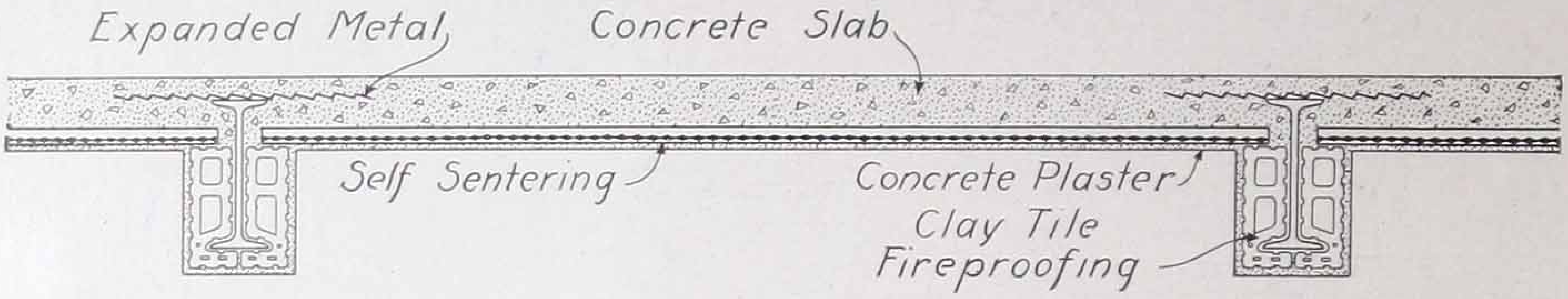
Self-Sentering sheets, with ends curved to the proper radius at the factory, rest on the lower flange of steel beams, acting not only as reinforcing and centering for the slab, but as a form for the fireproofing of the sides of the beam. The bottom of the beam is wrapped with Expanded Metal lath and plastered at the same time as the underside of the slab. By using Style "3-10-265" Expanded Metal over the supports as shown, this slab will carry approximately 25% more than shown by table on page 11.

Data for Estimating Type No. 4 Self-Sentering Floor Construction



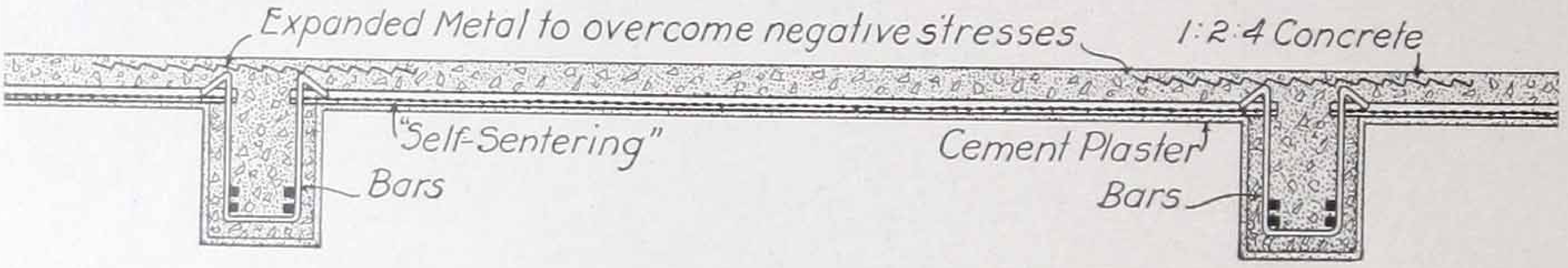
A Inches	B Inches	C Inches	L Inches	A Inches	B Inches	C Inches	L Inches	A Inches	B Inches	C Inches	L Inches
4	12	9	10	10¾	12	12	17½	17½	17½	17½	27½
4¼	12	9¼	10½	11	12	12	17¾	17¾	17¾	17¾	27¾
4½	12	9½	10¾	11¼	12	12	18¼	18	18	18	28¼
4¾	12	9½	11	11½	12	12	18½	18¼	18¼	18¼	28½
5	12	9¾	11½	11¾	12	12	18½	18½	18½	18½	29
5¼	12	10	11¾	12	12	12	18¾	18¾	18¾	18¾	29½
5½	12	10	12	12¼	12¼	12¼	19¼	19	19	19	30
5¾	12	10¼	12¼	12½	12½	12½	19½	19¼	19¼	19¼	30¼
6	12	10½	12½	12¾	12¾	12¾	20	19½	19½	19½	30½
6¼	12	10½	12¾	13	13	13	20½	19¾	19¾	19¾	31
6½	12	10½	13	13¼	13¼	13¼	20¾	20	20	20	31½
6¾	12	10¾	13½	13½	13½	13½	21¼	20¼	20¼	20¼	31¾
7	12	11	13¾	13¾	13¾	13¾	21½	20½	20½	20½	32¼
7¼	12	11	14	14	14	14	22	20¾	20¾	20¾	32½
7½	12	11¼	14½	14¼	14¼	14¼	22½	21	21	21	33
7¾	12	11¼	14½	14½	14½	14½	22¾	21¼	21¼	21¼	33½
8	12	11½	15	14¾	14¾	14¾	23¼	21½	21½	21½	33¾
8¼	12	11½	15	15	15	15	23½	21¾	21¾	21¾	34¼
8½	12	11½	15¼	15¼	15¼	15¼	24	22	22	22	34½
8¾	12	11½	15½	15½	15½	15½	24½	22¼	22¼	22¼	35
9	12	11½	15¾	15¾	15¾	15¾	24¾	22½	22½	22½	35½
9¼	12	11¾	16¼	16	16	16	25¼	22¾	22¾	22¾	35¾
9½	12	11¾	16½	16¼	16¼	16¼	25½	23	23	23	36¼
9¾	12	11¾	16½	16½	16½	16½	26	23¼	23¼	23¼	36½
10	12	11¾	16¾	16¾	16¾	16¾	26½	23½	23½	23½	37
10¼	12	11¾	17	17	17	17	26¾	23¾	23¾	23¾	37½
10½	12	12	17½	17¼	17¼	17¼	27	24	24	24	37¾

Self-Sentering Floor—Type No. 6



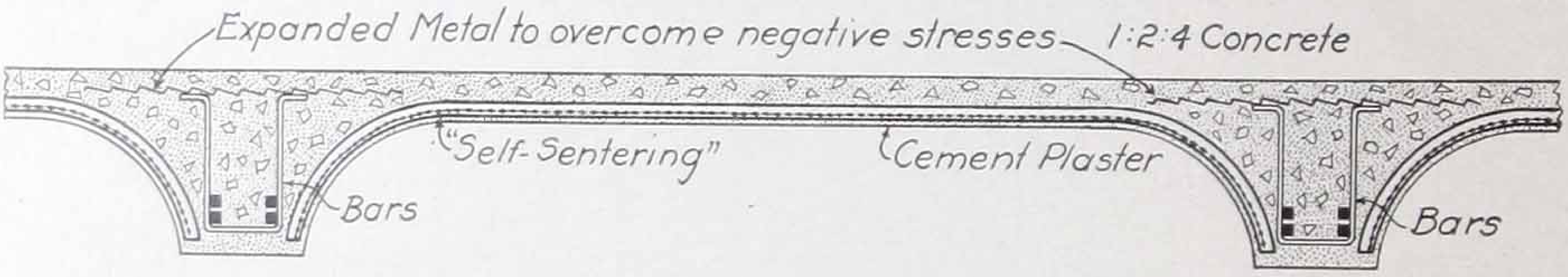
This type of floor is the same as No. 3 except that terra cotta tile is used for fireproofing the beams. This saves the ost of beam boxes on occasions where the cost would be prohibitive.

Self-Sentering Floor—Type No. 7



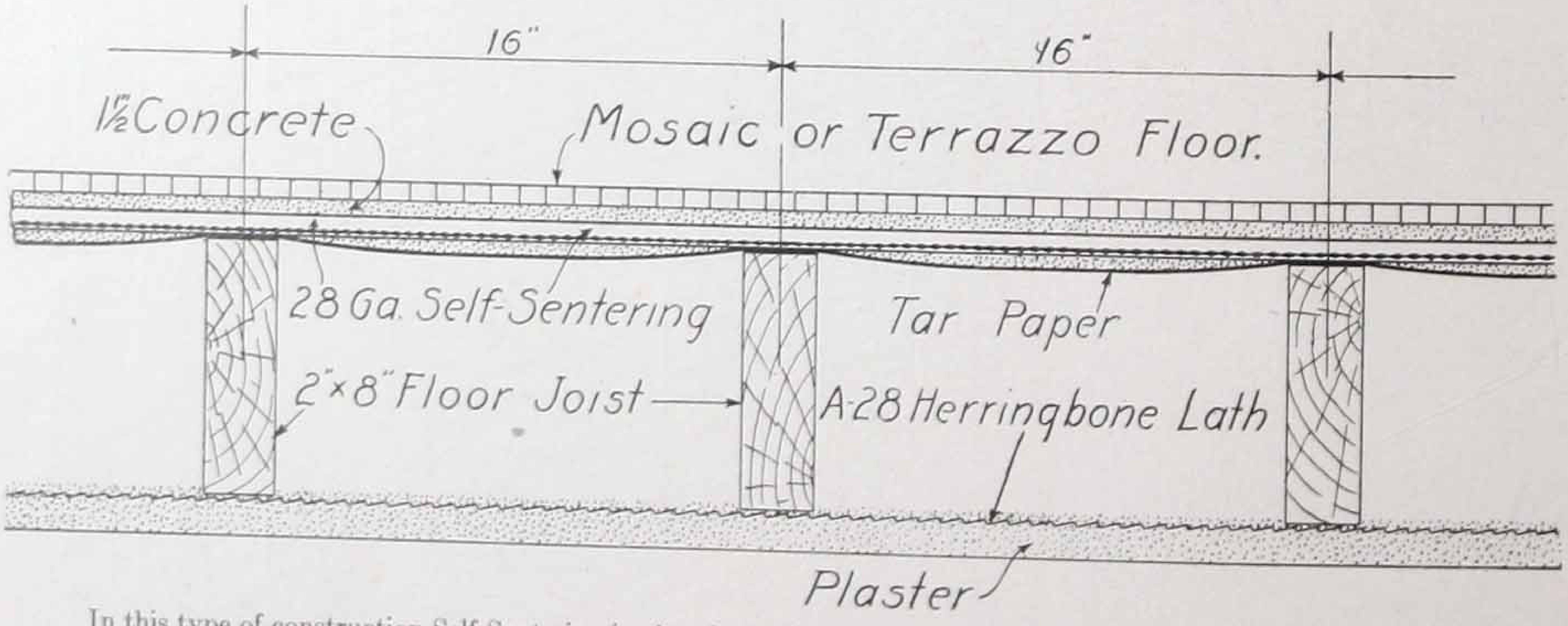
Self-Sentering sheets are supported by sides of beam boxes and concrete applied to the necessary thickness at the same time beams are poured. Underside to be plastered after beam boxes are removed. Self-Sentering acts as both form and reinforcement. By using Style "3-10-265" Expanded Metal over the supports, as shown, this slab will carry approximately 25% more than shown by table on page 11.

Self-Sentering Floor—Type No. 8



Self-Sentering sheets, curved at ends to exact radius required, are placed with ends resting on bottom board of beam boxes, acting not only as form and reinforcing for the slab but also as form for the sides of the concrete beam. By using Style "3-10-265" Expanded Metal over the supports as shown, this slab will carry approximately 25% more than shown by table on page 11

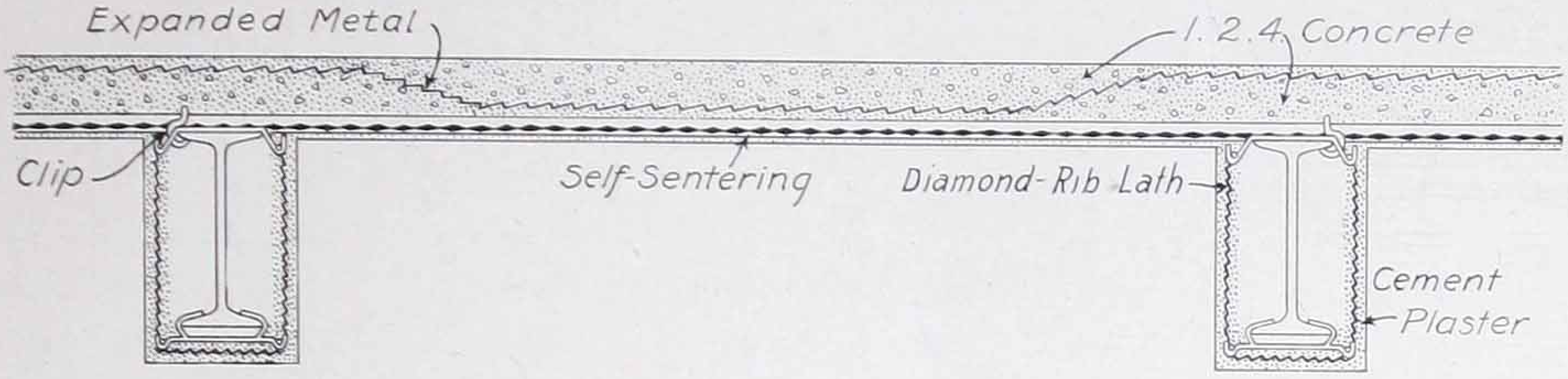
Self-Sentering Floor—Type No. 10



In this type of construction Self-Sentering is placed over building paper direct on wood joists and forms the base for a 1½-inch cement coat to hold terrazzo, mosaic or tile floors. This gives a reinforced concrete slab which absolutely prevents the cracks so common to the old method of doing this work.

The same construction is adaptable for any wood frame structure rendering it fire retarding. Floors may be finished with wood, composition flooring, etc.

Self-Sentering Floor—Type No. 11



Where extra heavy loads are required and an arched floor is not desirable, additional reinforcement in the form of expanded metal may be added, and the table below shows safe live loads carried by the use of our Style "3-10-176" Expanded Metal.

Stress in steel, 16,000 pounds per square inch. N = 15.

Expanded metal to be in top of slab over supports and bent as shown.

Where laps occur they are to be at least 8 inches long and to occur as near the point of bend as possible.

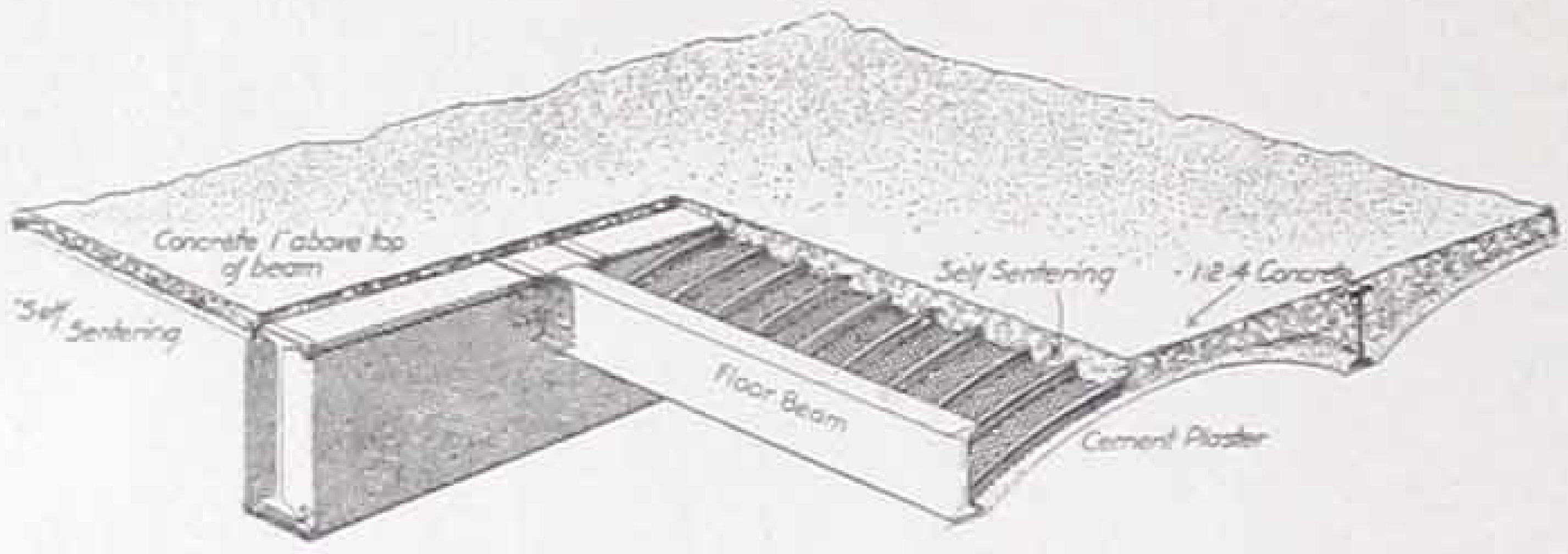
These tables are based on Style "3-10-176"—weighing .6 pounds per sq. ft., sectional area per foot of width .176 square inches. Bars or wire fabric having same sectional area may be substituted.

Resisting moments include reasonable allowance for increase due to negative reinforcement.

Gauge of Self-Sentering and Style of Expanded Metal	Thickness of Slab Above Bottom of Mesh	f c*	Resisting Moment Per Foot of Width in Inch Pounds	Span						
				6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
26 + "3-10-176"	3½"	800	20800	334	232	166	121	88		
24 + "3-10-176"		800	21400	350	242	174	127	93		
26 + "3-10-176"	4"	725	24200	394	275	208	144	106		
24 + "3-10-176"		800	23600	454	319	231	171	127	96	71
26 + "3-10-176"	4½"	675	27700	451	315	226	165	122	90	
24 + "3-10-176"		750	31400	500	365	264	196	147	110	82
26 + "3-10-176"	5"	610	31200	500	356	257	188	139	103	75
24 + "3-10-176"		690	35400		412	300	222	167	125	94
26 + "3-10-176"	5½"	575	34600		400	287	211	156	116	85
24 + "3-10-176"		640	39300		459	333	248	187	141	106
26 + "3-10-176"	6"	550	38160		438	317	233	173	129	95
24 + "3-10-176"		610	43290		500	371	276	208	158	121

*f c—maximum extreme fibre stress in concrete.

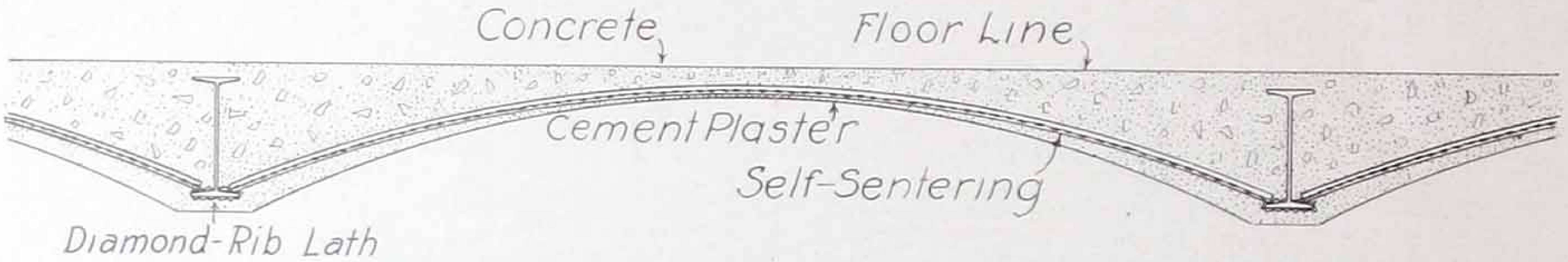
Arched Floors



FOR extra heavy loads, Self-Sentering permits of a very economical application of the arched slab. The sheets are curved at our factory, at a slight charge, to any desired radius and they are as easily and quickly applied as in flat slab work. Note the saving in form work—and every builder recognizes the expense of curved centering—not only in the slab itself, but, where used with concrete beams, only the bottom boards for beam boxes are required.

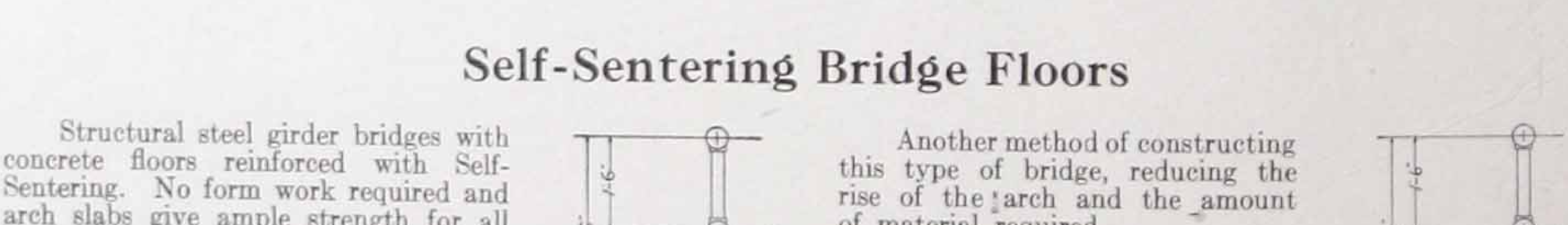
If there are any details for floor work which are not made clear here, our Engineering Department will be glad to work them out for you on request.

Self-Sentering Floor—Type No. 5



Self-Sentering sheets, curved to the proper radius in our factory, are placed with ends resting on lower flanges of beams. This makes the strongest type of floor and can be readily used on spans up to 12 feet. The lower flange of beam is wrapped with Expanded Metal lath and plastered at the same time as the underside of the slab.

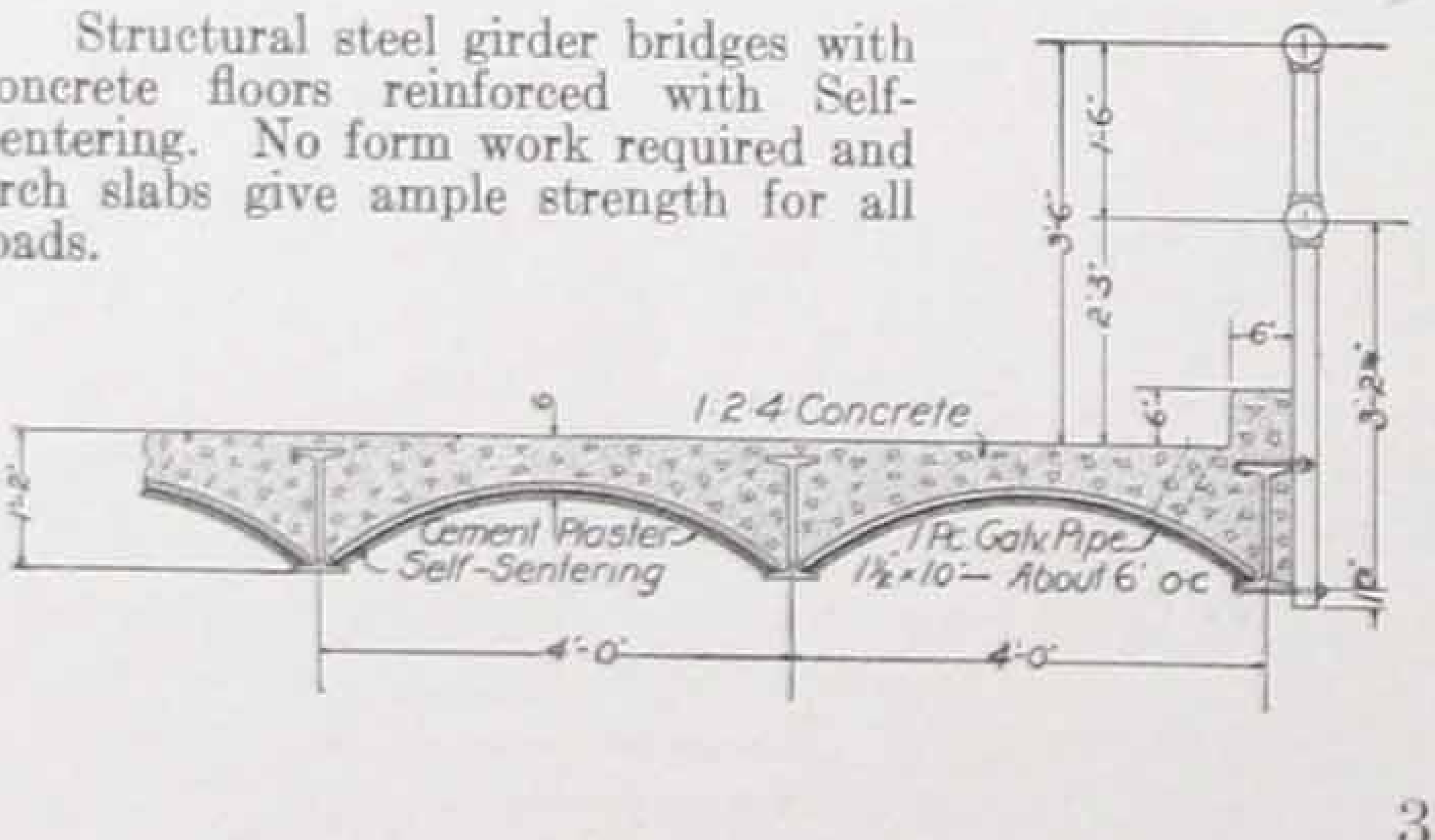
Self-Sentering Floor—Type No. 9



Suitable for extra heavy loads. Self-Sentering sheets, curved in our factory to the necessary radius, are used in the same manner as Type No. 8. The Self-Sentering acts as both form and reinforcement for the slab and forms for the side of the concrete beam.

Self-Sentering Bridge Floors

Structural steel girder bridges with concrete floors reinforced with Self-Sentering. No form work required and arch slabs give ample strength for all loads.



Another method of constructing this type of bridge, reducing the rise of the arch and the amount of material required.

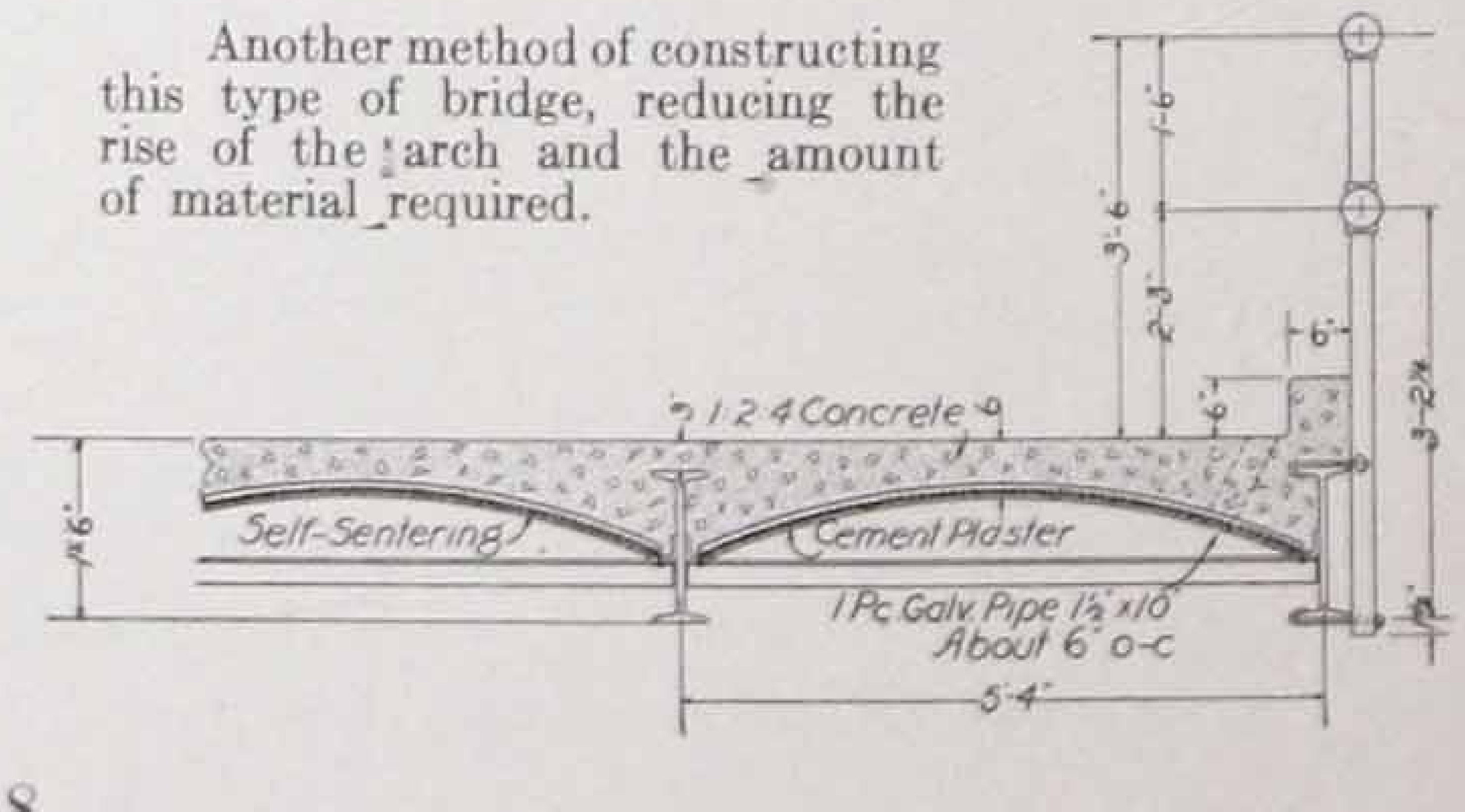
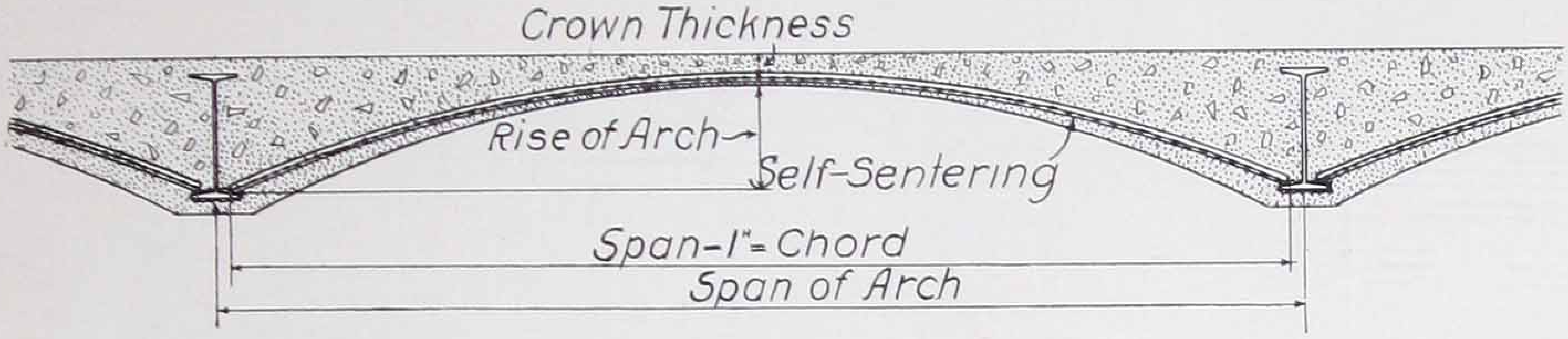


TABLE No. 7

Tables showing crown thickness required for various loads on stone and cinder concrete arches reinforced with Self-Sentering—No. 24 Gauge.



11′-0′′ SPAN

Rise in Inches	Live Loads in Pounds Per Sq. Ft.								Length of Sheet
	300		200		150		100		
	Stone	Cinder	Stone	Cinder	Stone	Cinder	Stone	Cinder	
12	5″	6½″	4″	5″	3½″	4″	3″	3¾″.	11′-2″
15	4″	4¾″	3½″	3¾″	3″	3½″	3″	3″	11′ -4″
18	3½″	3¾″	3″	3¼″	3″	3″	3″	3″	11′-6″
21	3″	3½″	3″	3″	3″	3″	3″	3″	11′-8½″
24	3″	3½″	3″	3″	3″	3″	3″	3″	11′-11″
10′-0′′ SPAN									
12	4½″	5½″	4″	4¼″	3½″	3¾″	3″	3¼″	10′-2½″
15	3½″	4″	3″	3½″	3″	3″	3″	3″	10′-4½″
18	3″	3½″	3″	3″	3″	3″	3″	3″	10′-6¾″
21	3″	3″	3″	3″	3″	3″	3″	3″	10′-9½″
24	3″	3″	3″	3″	3″	3″	3″	3″	11′-0″
9′-0′′ SPAN									
12	3″	5″	3″	4¼″	3″	3½″	3″	3″	9′- 3″
15	3″	4″	3″	3½″	3″	3″	3″	3″	9′- 5″
18	3″	3¼″	3″	3″	3″	3″	3″	3″	9′- 7½″
21	3″	3″	3″	3″	3″	3″	3″	3″	9′-10½″
24	3″	3″	3″	3″	3″	3″	3″	3″	10′- 1½″
8′-0′′ SPAN									
9	3″	5″	3″	4″	3″	3½″	3″	3″	8′- 1½″
12	3″	4¼″	3″	4″	3″	3″	3″	3″	8′- 3½″
15	3″	3¾″	3″	3½″	3″	3″	3″	3″	8′- 5¾″
18	3″	3″	3″	3″	3″	3″	3″	3″	8′- 8½″
21	3″	3″	3″	3″	3″	3″	3″	3″	8′-11¾″
24	3″	3″	3″	3″	3″	3″	3″	3″	9′- 3½″
7′-0′′ SPAN									
9	3″	5″	3″	3¾″	3″	3¼″	3″	3″	7′- 2″
12	3″	4″	3″	3½″	3″	3″	3″	3″	7′- 4″
15	3″	3½″	3″	3″	3″	3″	3″	3″	7′- 6¾″
18	3″	3″	3″	3″	3″	3″	3″	3″	7′- 9¾″
21	3″	3″	3″	3″	3″	3″	3″	3″	8′- 1½″
24	3″	3″	3″	3″	3″	3″	3″	3″	8′- 5½″
6′-0′′ SPAN									
9	3″	4½″	3″	3½″	3″	3″	3″	3″	6′- 2″
12	3″	3½″	3″	3½″	3″	3″	3″	3″	6′- 4½″
15	3″	3″	3″	3″	3″	3″	3″	3″	6′- 7½″
18	3″	3″	3″	3″	3″	3″	3″	3″	6′-11″
21	3″	3″	3″	3″	3″	3″	3″	3″	7′- 3″
24	3″	3″	3″	3″	3″	3″	3″	3″	7′- 7½″

TABLE No. 8

Showing weight per square foot of stone concrete arches averaged over entire span.

12′-0″ SPAN

Rise	Thickness of Slab at Crown of Arch									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	138	132	126	120	114	108	102	96	90	84
15″	150	144	138	132	126	120	114	108	102	96
18″	161	155	149	143	137	131	125	119	113	107
21″	173	167	161	155	149	143	137	131	125	119
24″	183	177	171	165	159	153	147	141	135	129

11′-0″ SPAN

12″	140	134	128	122	116	110	104	98	92	86
15″	149	143	137	131	125	119	113	107	101	95
18″	161	155	149	143	137	131	125	119	113	107
21″	172	166	160	154	148	142	136	130	124	118
24″	183	177	171	165	159	153	147	141	135	129

10′-0″ SPAN

12″	140	134	128	122	116	110	104	98	92	86
15″	149	143	137	131	125	119	113	107	101	95
18″	161	155	149	143	137	131	125	119	113	107
21″	171	165	159	153	147	141	135	129	123	117
24″	180	174	168	162	156	150	144	138	132	126

9′-0″ SPAN

12″	138	132	126	120	114	108	102	96	90	84
15″	149	143	137	131	125	119	113	107	101	95
18″	160	154	148	142	136	130	124	118	112	106
21″	171	165	159	153	147	141	135	129	123	117
24″	180	174	168	162	156	150	144	138	132	126

8′-0″ SPAN

9″	127	121	115	109	103	97	91	85	79	73
12″	138	132	126	120	114	108	102	96	90	84
15″	149	143	137	131	125	119	113	107	101	95
18″	159	153	147	141	135	129	123	117	111	105
21″	170	164	158	152	146	140	134	128	122	116
24″	179	173	167	161	155	149	143	137	131	125

7′-0″ SPAN

9″	126	120	114	108	102	96	90	84	78	72
12″	138	132	126	120	114	108	102	96	90	84
15″	149	143	137	131	125	119	113	107	101	95
18″	159	153	147	141	135	129	123	117	111	105
21″	168	162	156	150	144	138	132	126	120	114
24″	177	171	165	159	153	147	141	135	129	123

TABLE No. 9

Showing weight per square foot of cinder concrete arches averaged over entire span.

12′-0″ SPAN

Rise	Thickness of Slab at Crown of Arch									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	86	83	79	75	71	68	64	60	56	53
15″	94	90	86	83	79	75	71	68	64	60
18″	101	97	93	89	86	82	78	74	71	67
21″	108	104	101	97	93	89	86	82	78	74
24″	114	111	107	103	99	96	92	88	84	81

11′-0″ SPAN

12″	87	84	80	76	73	69	65	61	58	54
15″	93	89	86	82	78	74	71	67	63	59
18″	101	97	93	89	86	82	78	74	71	67
21″	108	104	100	96	93	89	85	81	78	74
24″	114	111	107	103	99	96	92	88	84	81

10′-0″ SPAN

12″	87	84	80	76	73	69	65	61	58	54
15″	93	89	86	82	78	74	71	67	63	59
18″	101	97	93	89	86	82	78	74	71	67
21″	107	103	99	96	92	88	84	81	77	73
24″	113	109	105	102	98	94	90	87	83	79

9′-0″ SPAN

12″	86	83	79	75	71	68	64	60	56	53
15″	93	89	86	82	78	74	71	67	63	59
18″	100	96	93	89	85	81	78	74	70	66
21″	107	103	99	96	92	88	84	81	77	73
24″	112	108	105	101	97	93	90	86	82	78

8′-0″ SPAN

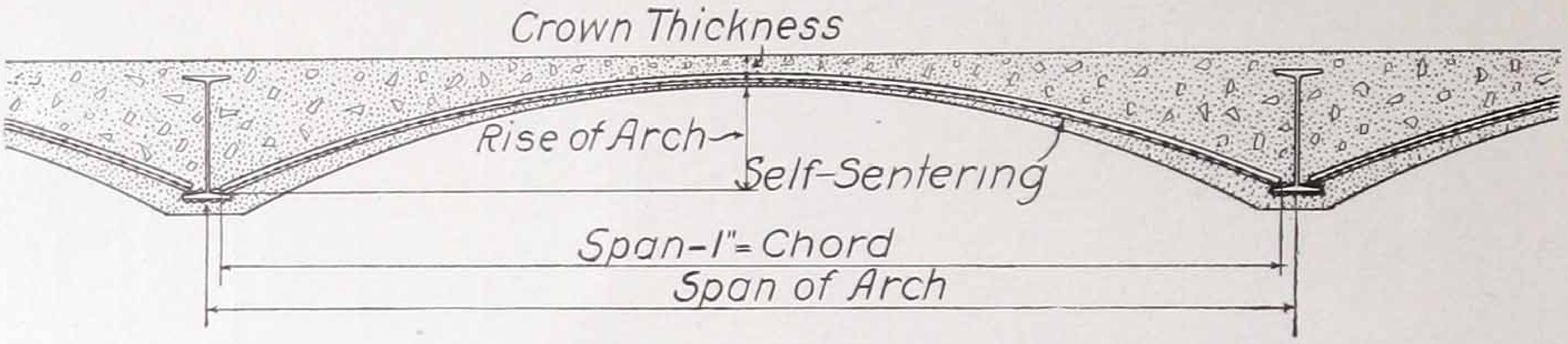
9″	79	76	72	68	64	61	57	53	49	46
12″	86	83	79	75	71	68	64	60	56	53
15″	93	89	86	82	78	74	71	67	63	59
18″	99	96	92	88	84	81	77	73	69	66
21″	106	103	99	95	91	88	84	80	76	73
24″	112	108	104	101	97	93	89	86	82	78

7′-0″ SPAN

9″	79	75	71	68	64	60	56	52	49	45
12″	86	83	79	75	71	68	64	60	56	53
15″	93	89	86	82	78	74	71	67	63	59
18″	99	96	92	88	84	81	77	73	69	66
21″	105	101	98	94	90	86	83	79	75	71
24″	111	107	103	99	96	92	88	84	81	77

Table No. 10

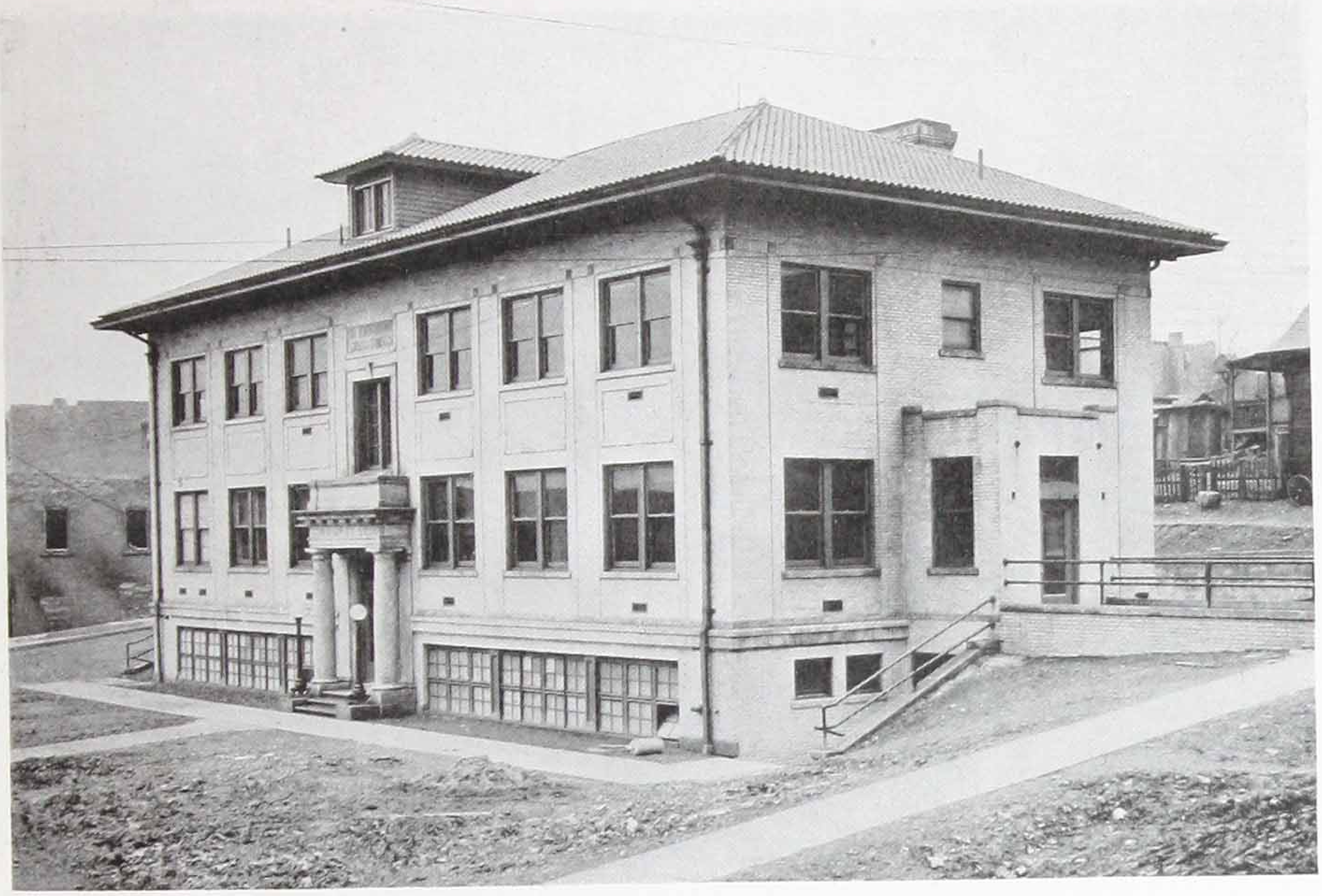
Showing method of computing lengths of curved Self-Sentering.



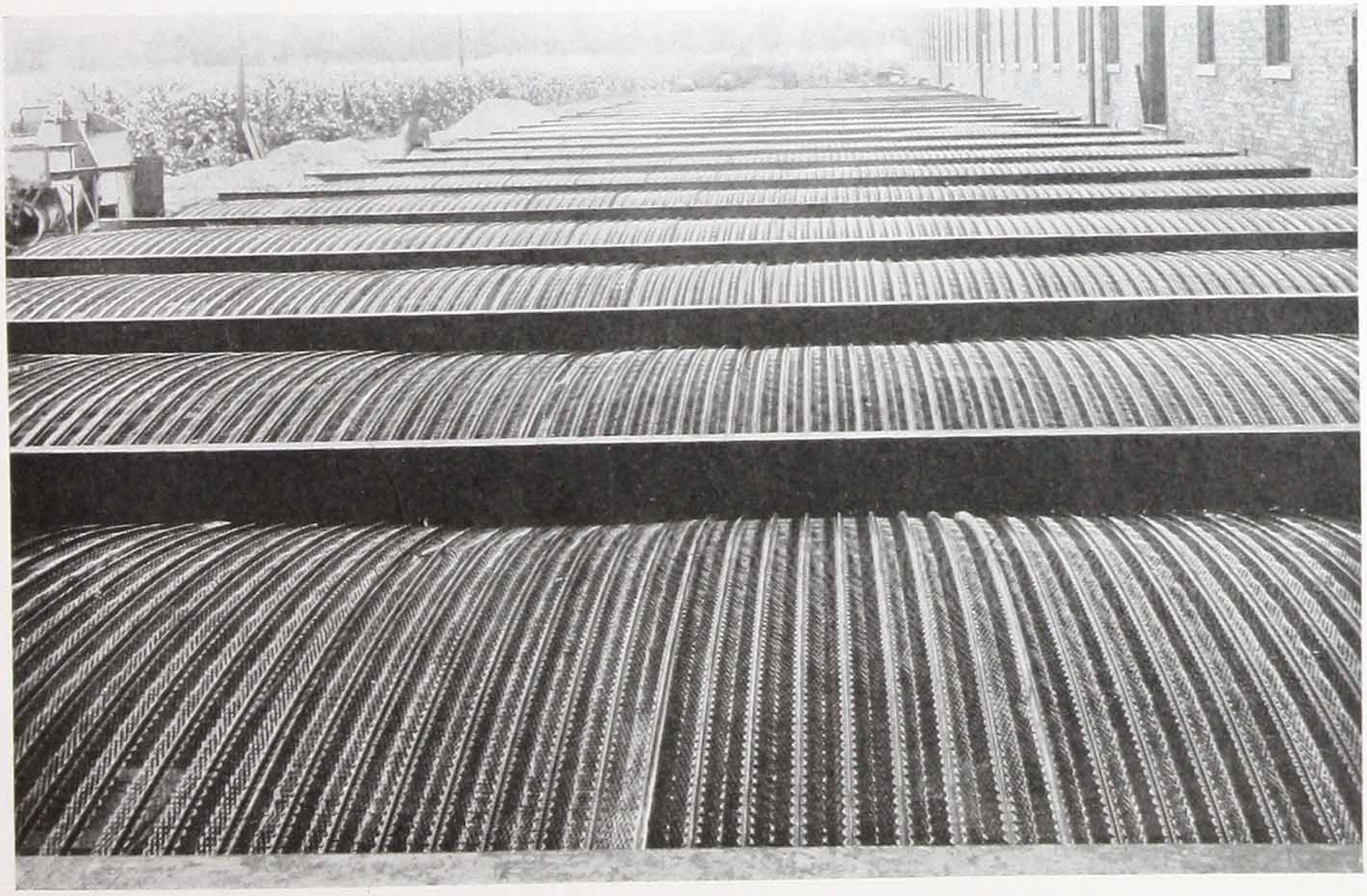
Rule—Divide rise by chord; find in the column of heights the number equal to this quotient. Multiply corresponding number in column of lengths by chord. Product equals length of sheet in inches. All quantities to be reduced to inches before commencing operation.

Example—Find length of sheet, chord being 8′-4″, rise being 2′-1″, span being 8′-5″. 2′-1″ equals 25″; 8′-4″ equals 100″; 25-100 equals .25 and from table below in columns of lengths .25 equals 1.15912. 1.15912 × 100″ equals 115.912″ equals 9′-7.91″ equals 9′-8″ length of sheet required to make arch.

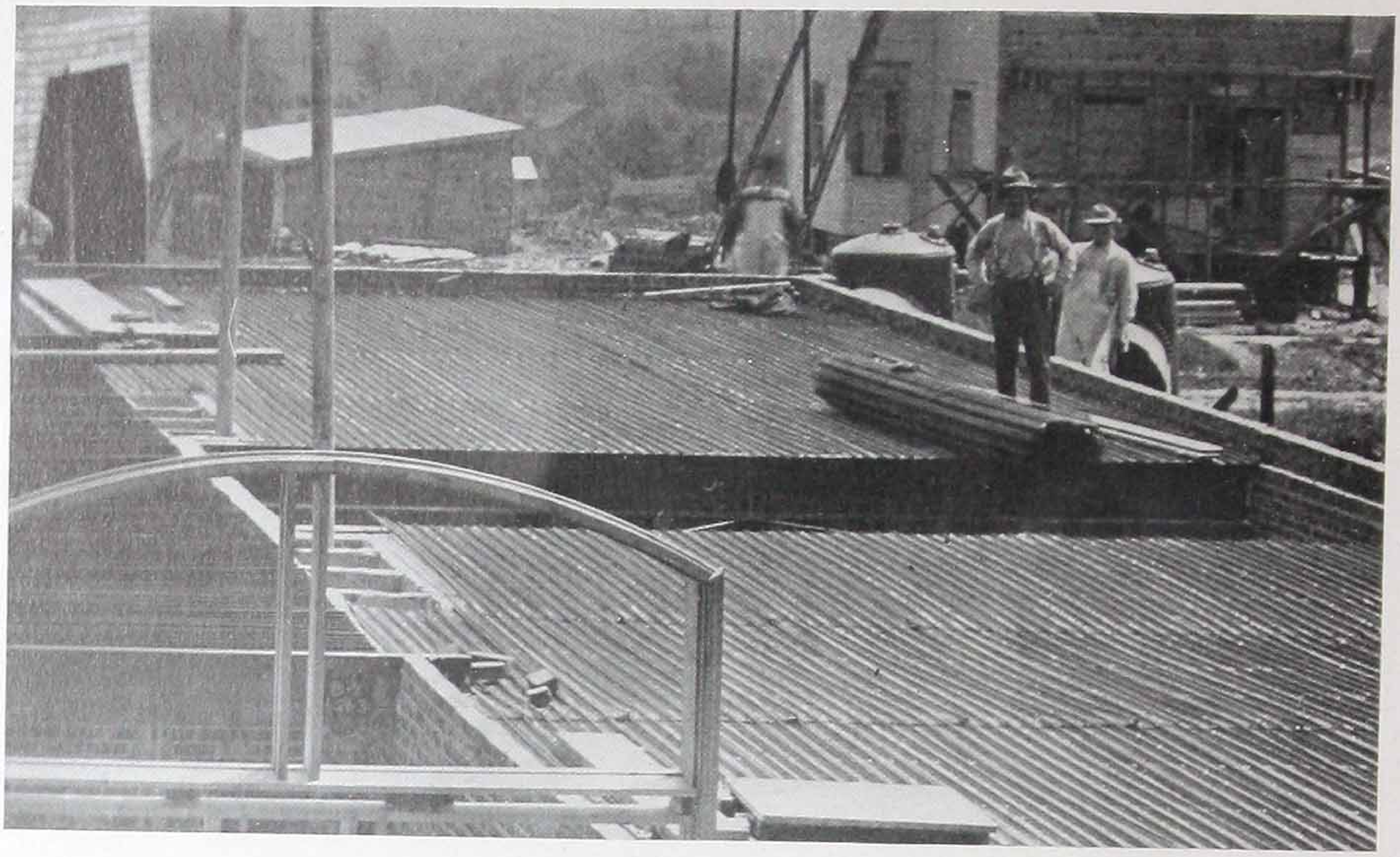
Heights	Lengths	Heights	Lengths	Heights	Lengths	Heights	Lengths
.025	1.00167	.190	1.09365	.295	1.21794	.400	1.38322
.050	1.00665	.195	1.09850	.300	1.22495	.405	1.39196
.075	1.01493	.200	1.10348	.305	1.23205	.410	1.40077
.100	1.02645	.205	1.10855	.310	1.23925	.415	1.40966
.105	1.02914	.210	1.11374	.315	1.24654	.420	1.41861
.110	1.03196	.215	1.11904	.320	1.25391	.425	1.42764
.115	1.03990	.220	1.12445	.325	1.26137	.430	1.43673
.120	1.03797	.225	1.12997	.330	1.26892	.435	1.44589
.125	1.04116	.230	1.13557	.335	1.27656	.440	1.45512
.130	1.04447	.235	1.14136	.340	1.28428	.445	1.46441
.135	1.04792	.240	1.14714	.345	1.29209	.450	1.47377
.140	1.05147	.245	1.15308	.350	1.29997	.455	1.48320
.145	1.05516	.250	1.15912	.355	1.30794	.460	1.49269
.150	1.05896	.255	1.16526	.360	1.31599	.465	1.50224
.155	1.06288	.260	1.17150	.365	1.32413	.470	1.51182
.160	1.06693	.265	1.17784	.370	1.33234	.475	1.52152
.165	1.07109	.270	1.18428	.375	1.34063	.480	1.53126
.170	1.07537	.275	1.19082	.380	1.34899	.485	1.54186
.175	1.07977	.280	1.19743	.385	1.35744	.490	1.55090
.180	1.08428	.285	1.20419	.390	1.36596	.495	1.56083
.185	1.08890	.290	1.21202	.395	1.37455	.500	1.57079



Youngstown Sheet & Tube Co. Hospital, Youngstown, Ohio. Self-Sentering Roof and Suspended Ceilings. Architect, Chas. F. Owsley, Youngstown; Contractor, Heller Bros., Youngstown; Plastering Contractor, Dougherty & Brennen, Youngstown

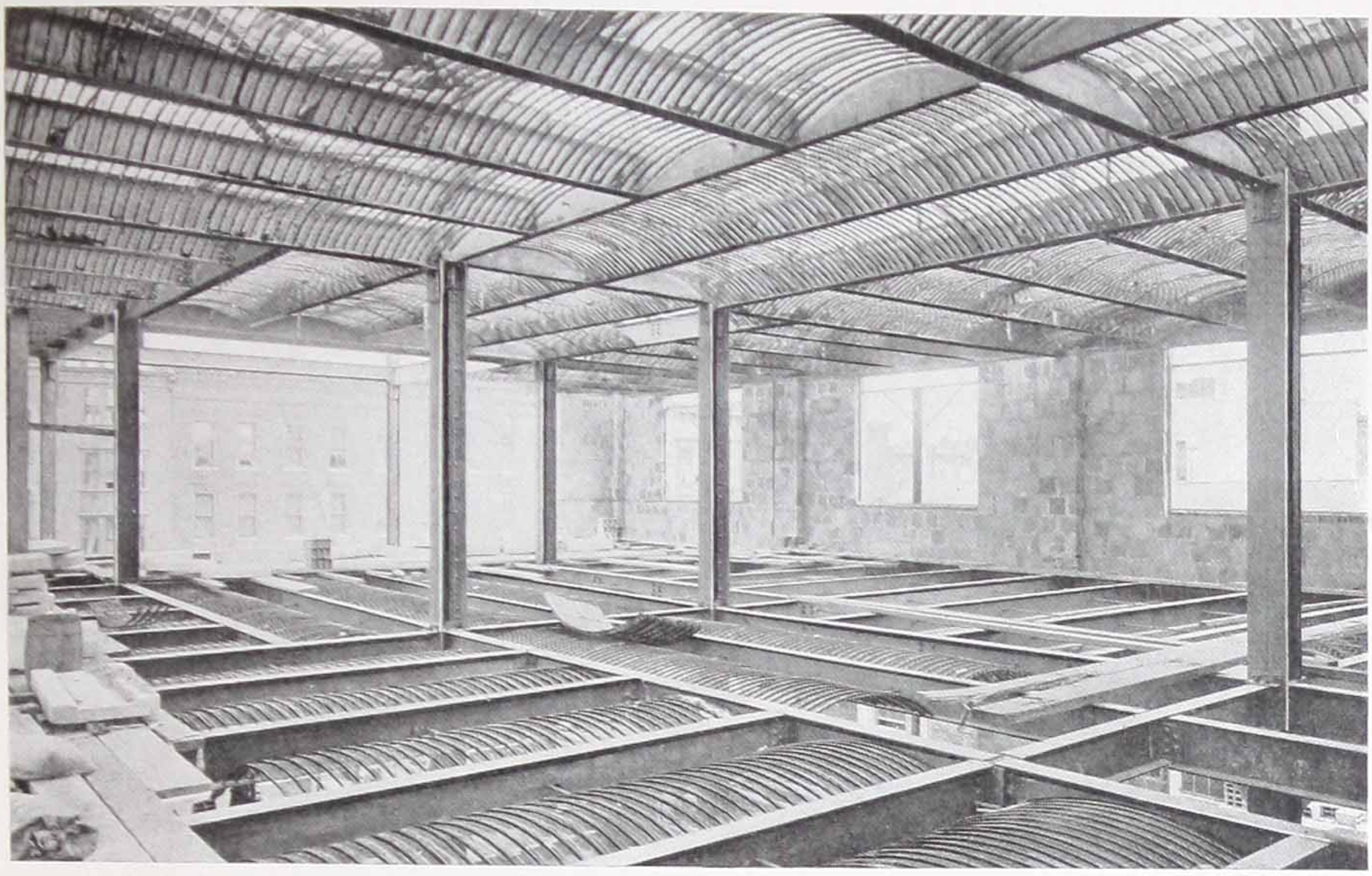


Loading Platform of Herschel Manufacturing Co., E. Peoria, Ill.
Showing Curved Self-Sentering on 12′ spans

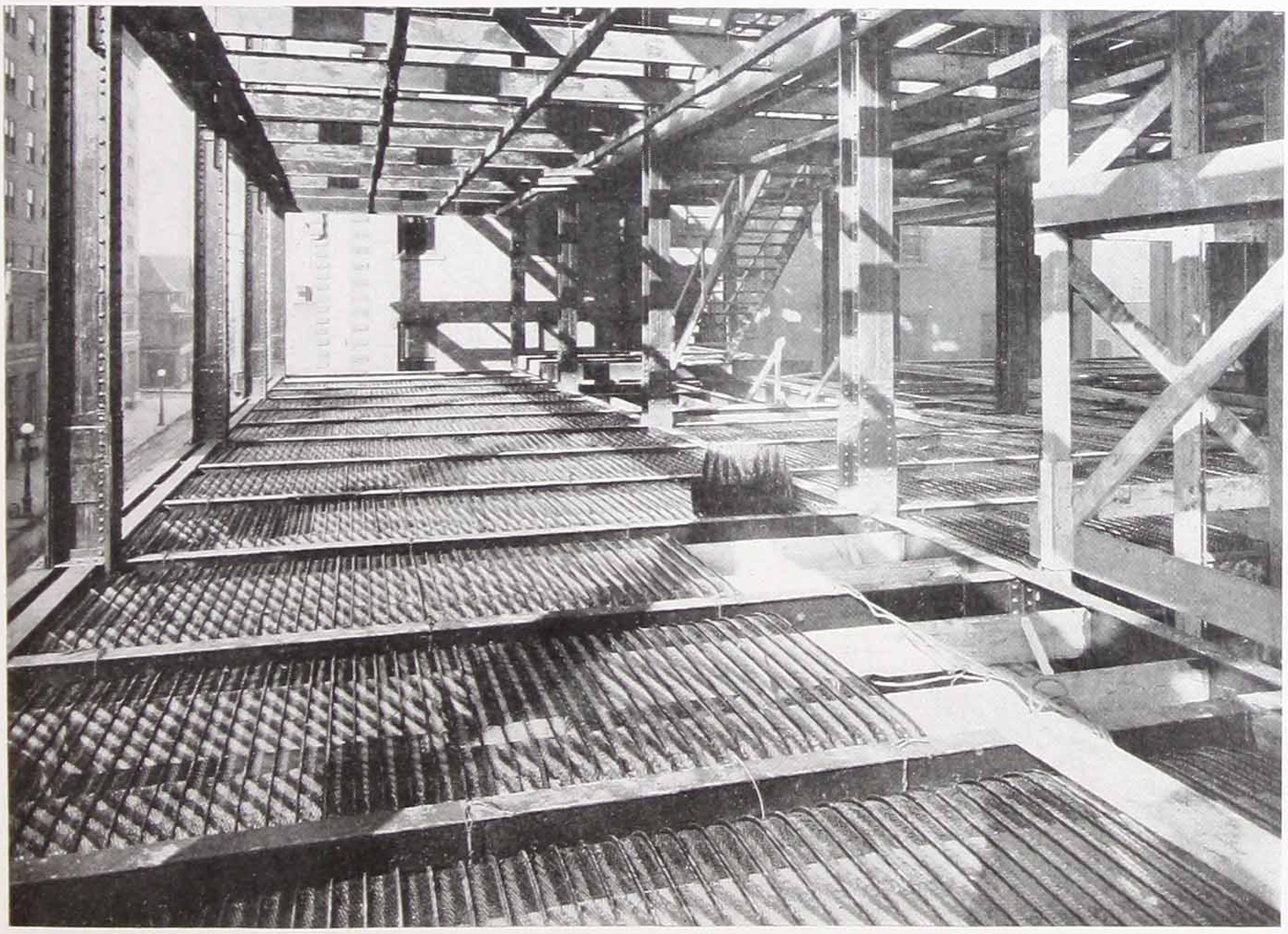


Oak Hill High School, Oswego, N. Y.
Sheets attached on the ground and hoisted to the roof in a roll
Architect, L. L. Cope, Oswego

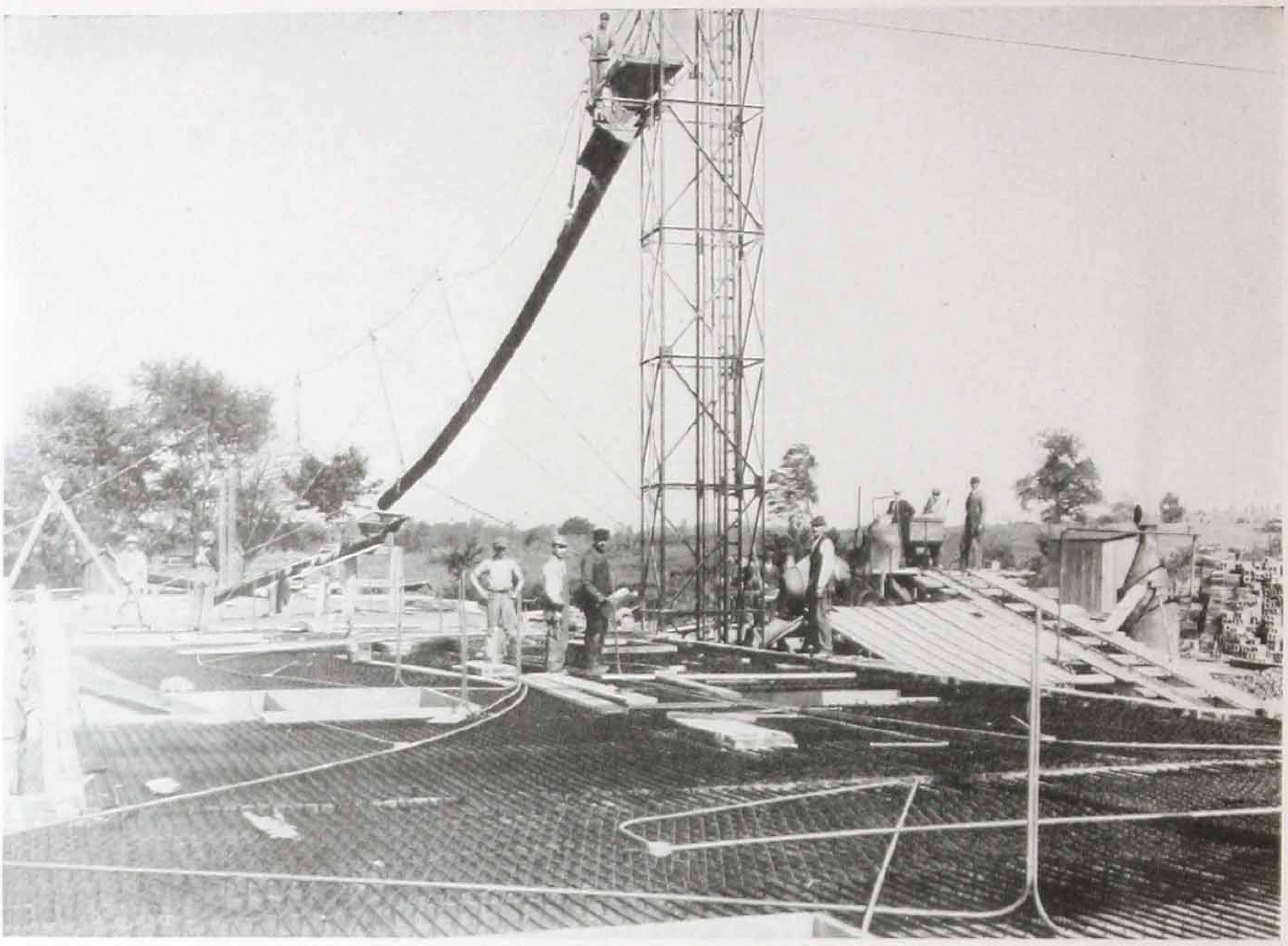
Completed Building, Oak Hill High School, Oswego, N. Y.



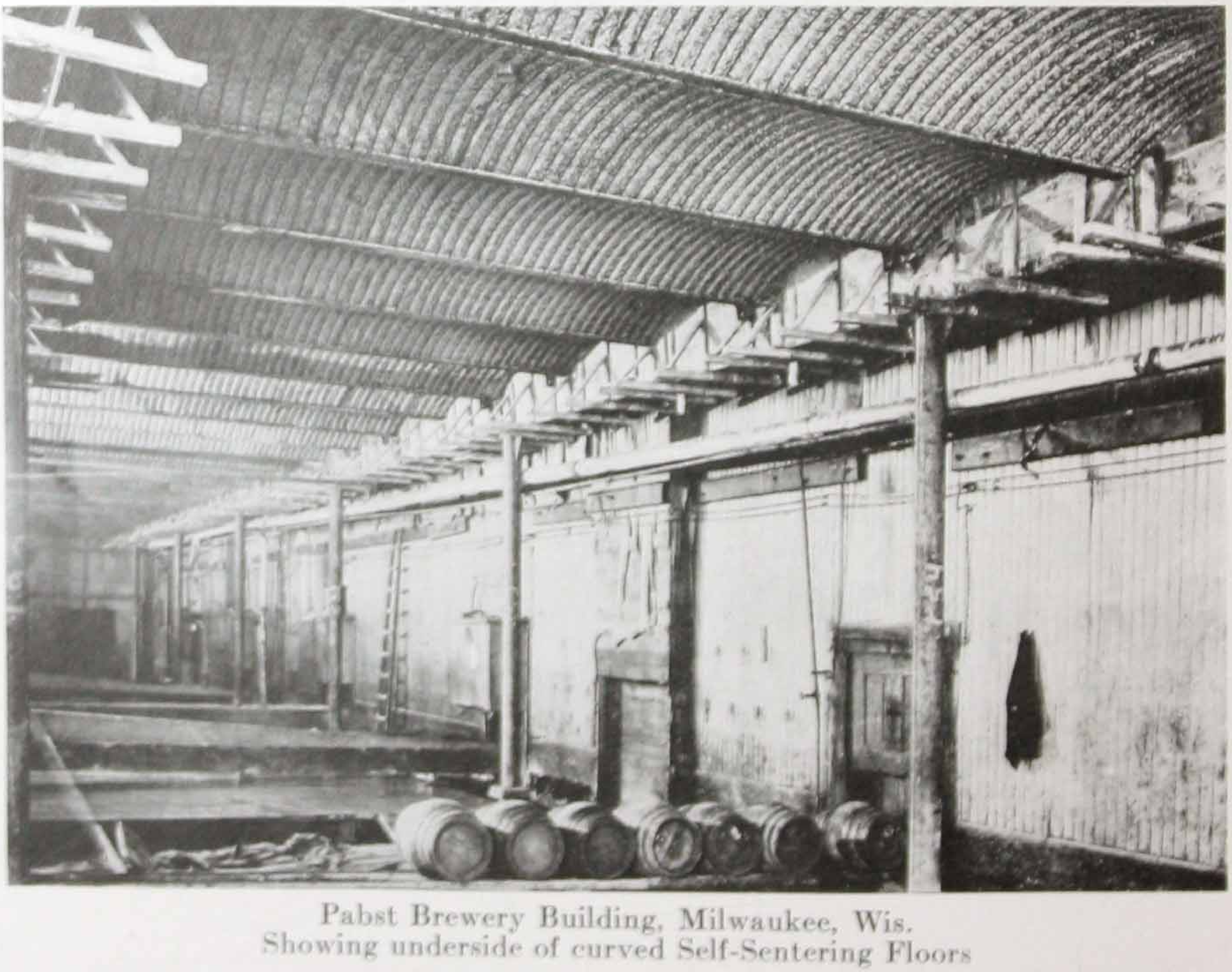
Municipal Building, Geneva, N. Y.
Curved Self-Sentering Floors
Architect, L. P. Adams, Geneva



City Hall, Youngstown, Ohio
Curved Self-Sentering used for floors throughout
Architect, Chas. F. Owsley, Youngstown, Ohio

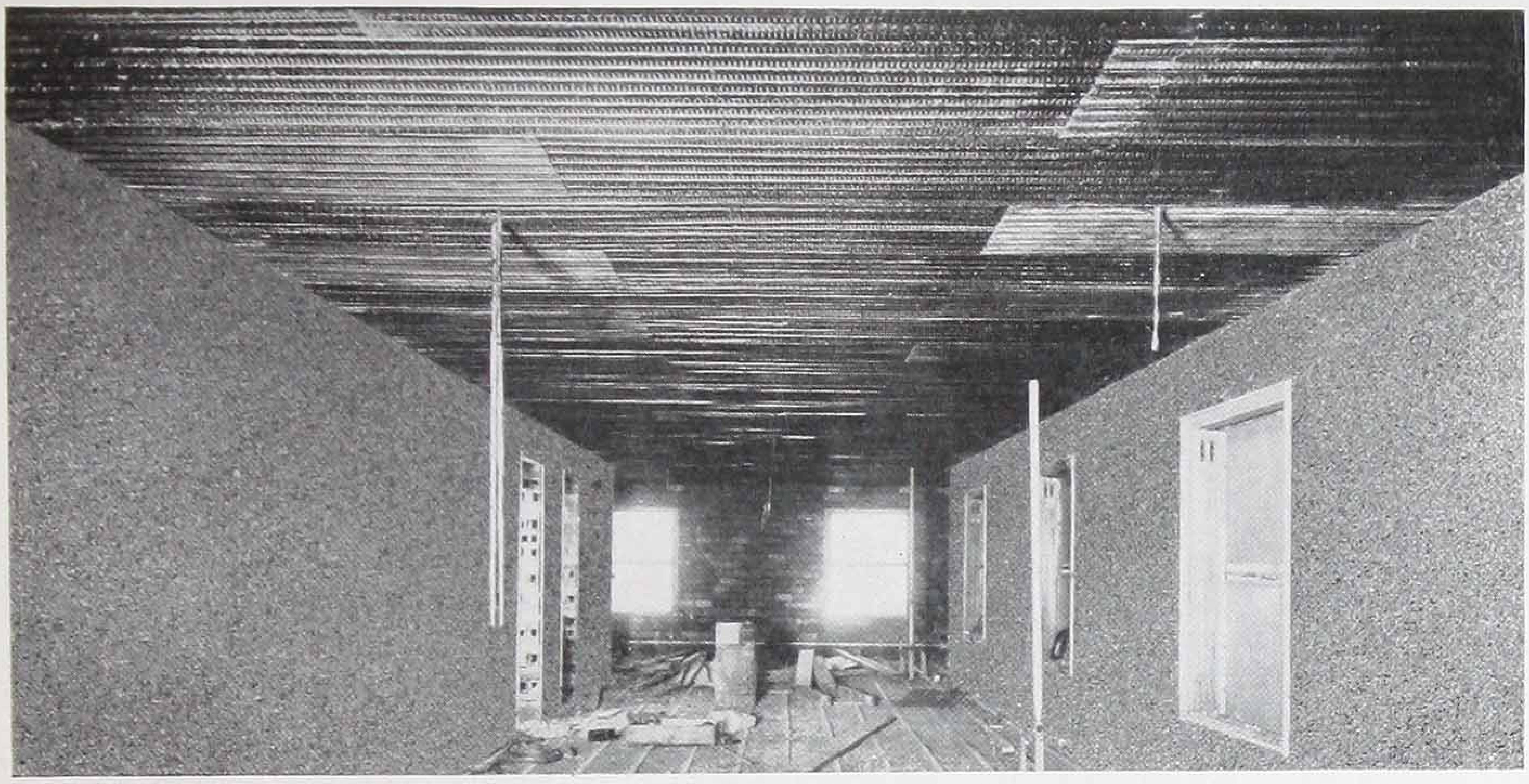


Grove City College, Grove City, Pa. Self-Sentering for floors of Boys' Dormitory
Style "3-10-176" Expanded Metal gives added reinforcement over corridors



Pabst Brewery Building, Milwaukee, Wis.
Showing underside of curved Self-Sentering Floors

Self-Sentering Ceilings



Self-Sentering Ceiling, South Side Bank, Youngstown, Ohio
H. C. Ellenberger, Architect

For fireproof ceiling work, wherever suspended ceilings are required, or where beams or other supports are too far apart to permit the use of metal lath without cross furring, Self-Sentering offers an economical type of construction. In this capacity, it acts as both lath and furring, the heavy ribs taking the place of small channels or angles necessary with metal lath and the diamond mesh connecting fabric, forming a perfect plastering surface. The Self-Sentering is merely secured by clips or wiring to all beams or hangers at every other heavy rib, these supports being spaced from 3 to 5 feet on centers, depending on the gauge of Self-Sentering used. Due to the close spacing (3⅝ inches center to center) of the Self-Sentering ribs, an unusually firm surface is afforded for the plaster and necessary strength is developed to support the ceiling load.

In addition to the added strength given to such a ceiling by reason of the closely spaced ribs, the saving in both time and material, effected by the elimination of all furring and the labor entailed in its application, is a very material consideration. The large sheets of Self-Sentering permit very rapid erection of such a ceiling, reducing the number of laps and cutting labor costs. Under circumstances as outlined above, this is the simplest and most economical form of fireproof ceiling.

Ceiling Specifications

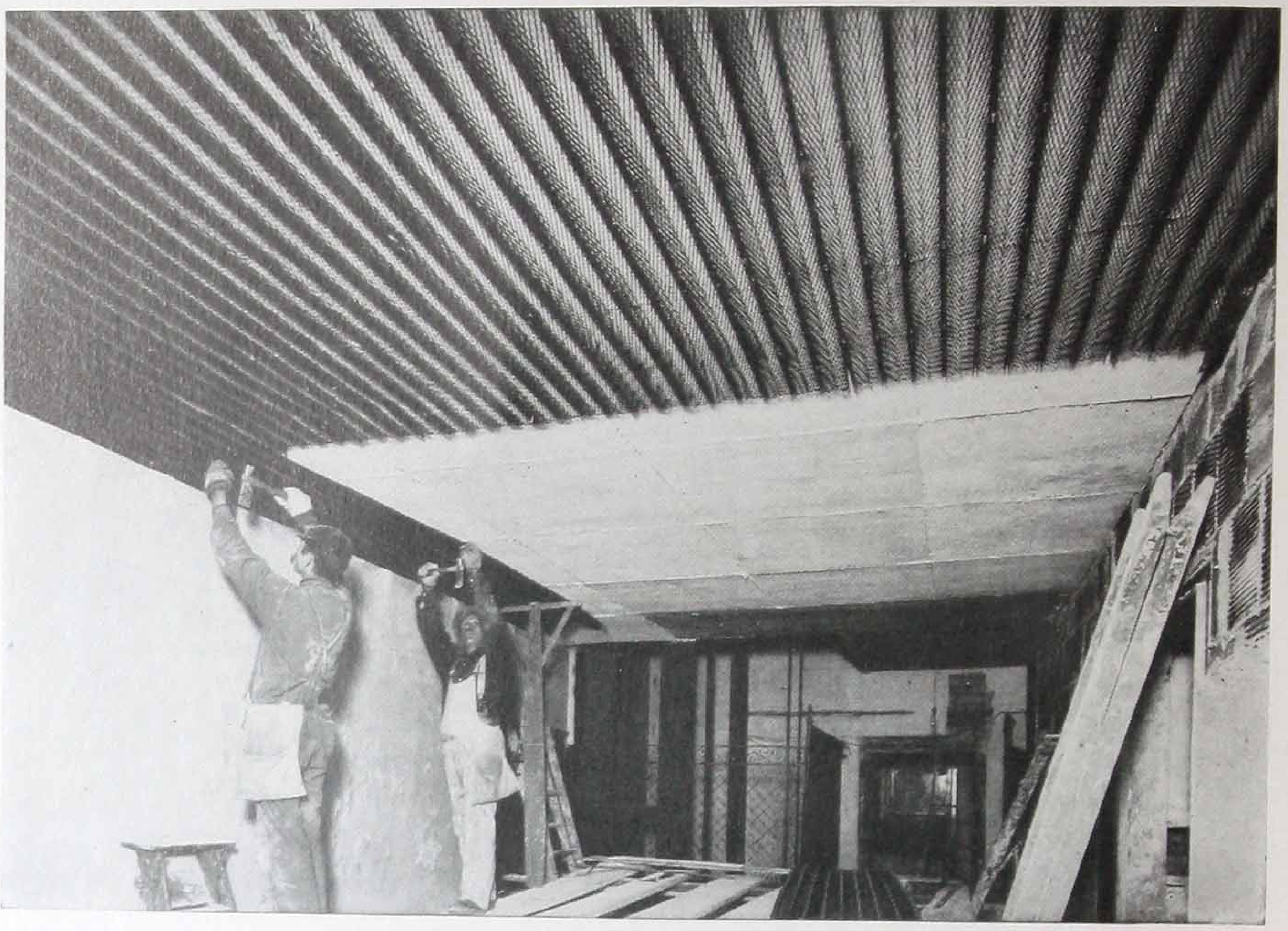
For all suspended ceilings, Self-Sentering shall be attached with lath surface down to lines of support at every other rib, either by wiring with No. 14 gauge wire, or by special clips. Supports may be varied as to spacing from 3 to 5 feet, using

28 gauge Self-Sentering for spans up to 4 feet.
26 gauge Self-Sentering for spans up to 5 feet.
24 gauge Self-Sentering for longer spans.

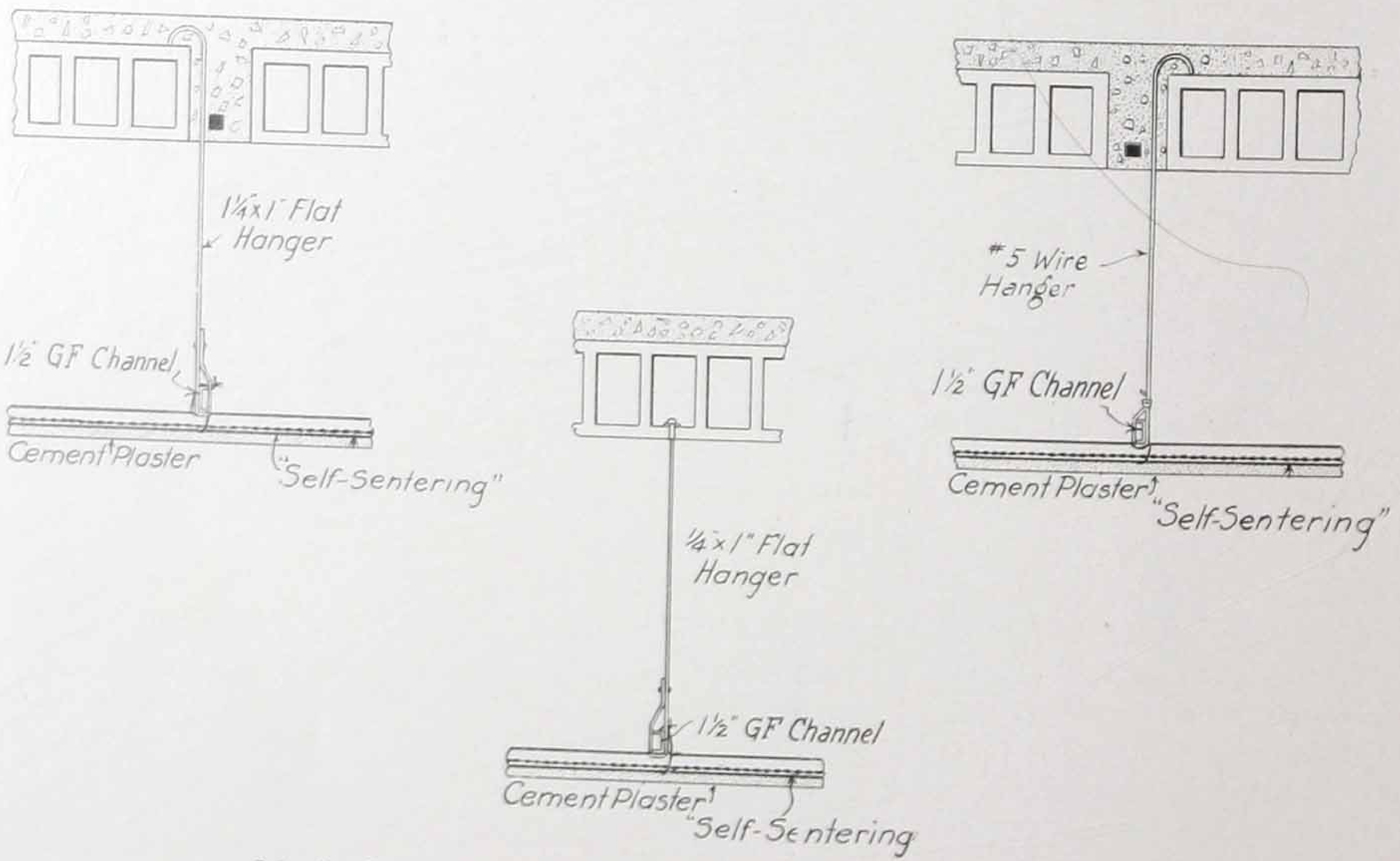
Supports to be hung from roof or floor slabs by ¼ x 1-inch flats or by ⅜-inch rounds. (The manufacturers of Self-Sentering can supply a special No. 5 Rod particularly suited for this purpose.) Supports (excepting regular floor beams), should be 1½-inch GF Channels.

Sides and ends of adjoining sheets shall be securely interlocked and fastened every two feet along the sides and at every other rib on the ends by wiring. Joints over supports to be 2 inches and between supports 8 inches, the latter to be properly staggered.

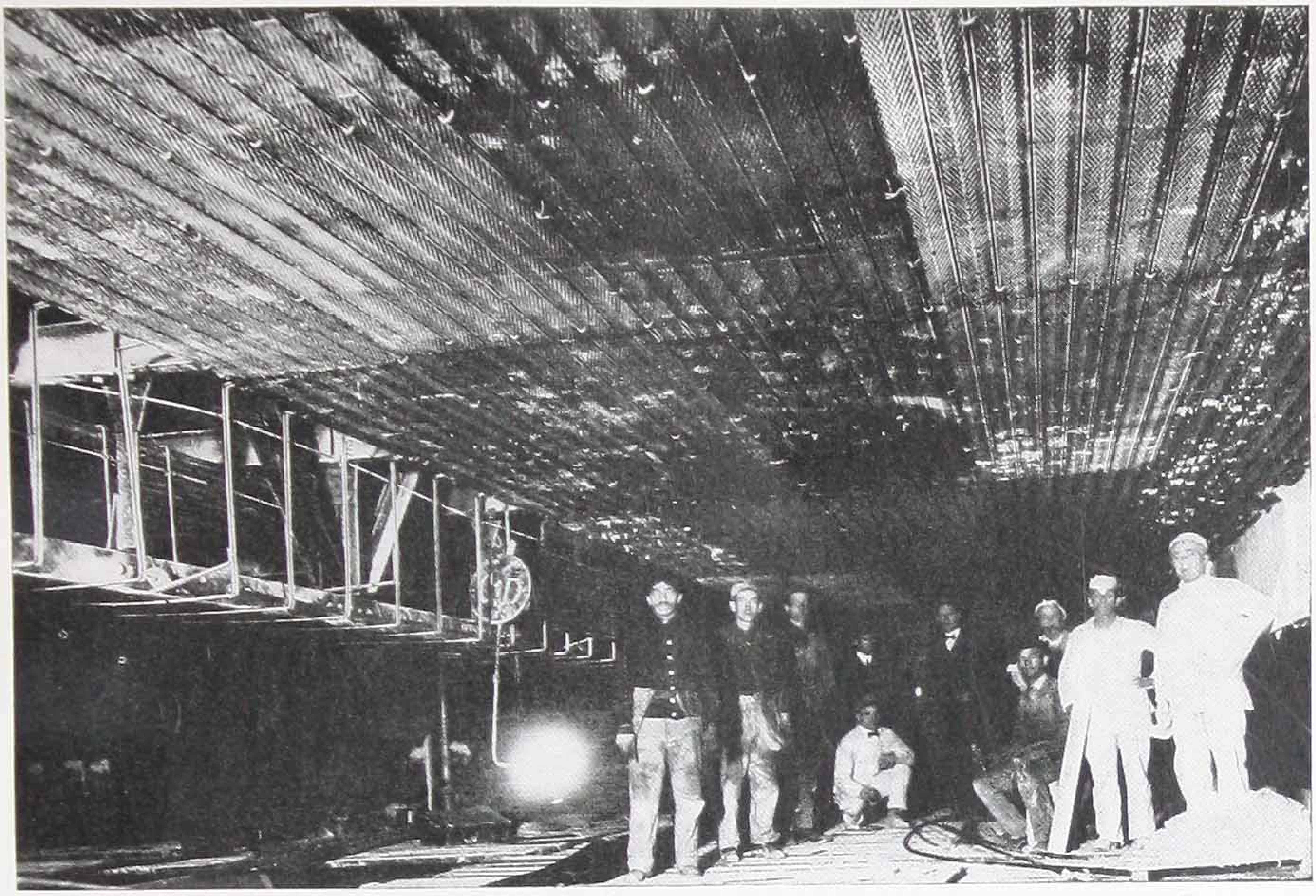
As in metal lath ceilings any type of plaster may be used, but it should contain double the amount of hair or fibre required for wood lath work.



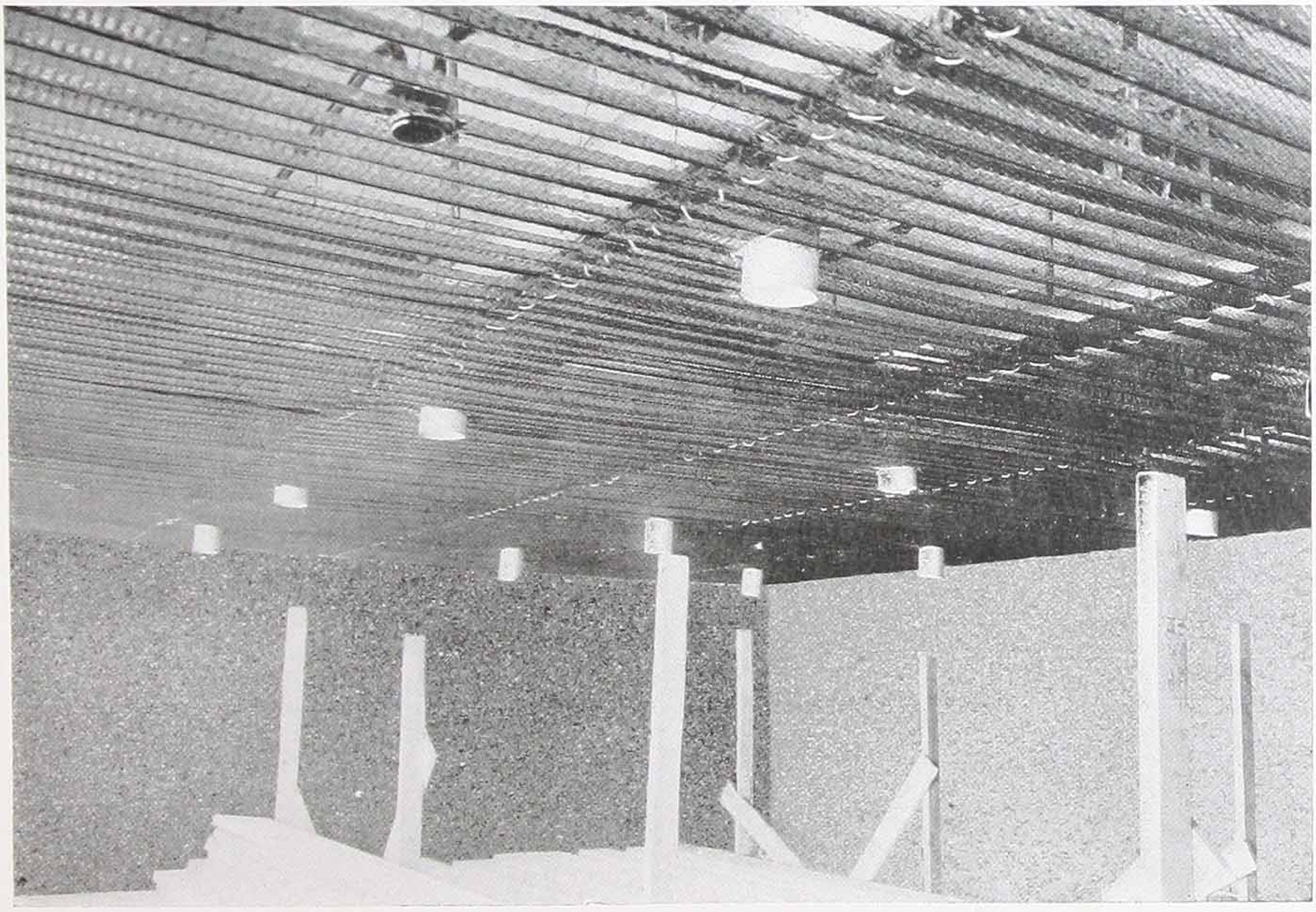
Greenwood Hall, Cincinnati
Self-Sentering Ceiling applied over Asbetos Board, Protecting Wood Joists
This construction required by Ohio State Building Code
for this Type of Building



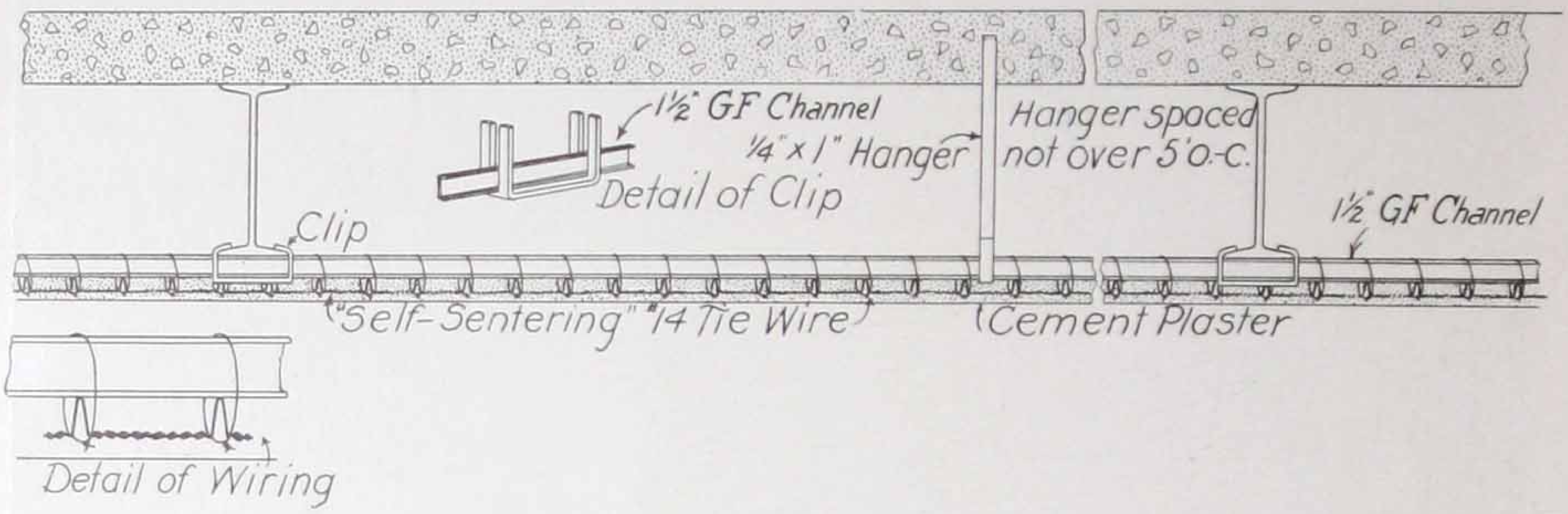
Methods of Hanging Self-Sentering Suspended Ceilings
from Tile and Concrete Slabs



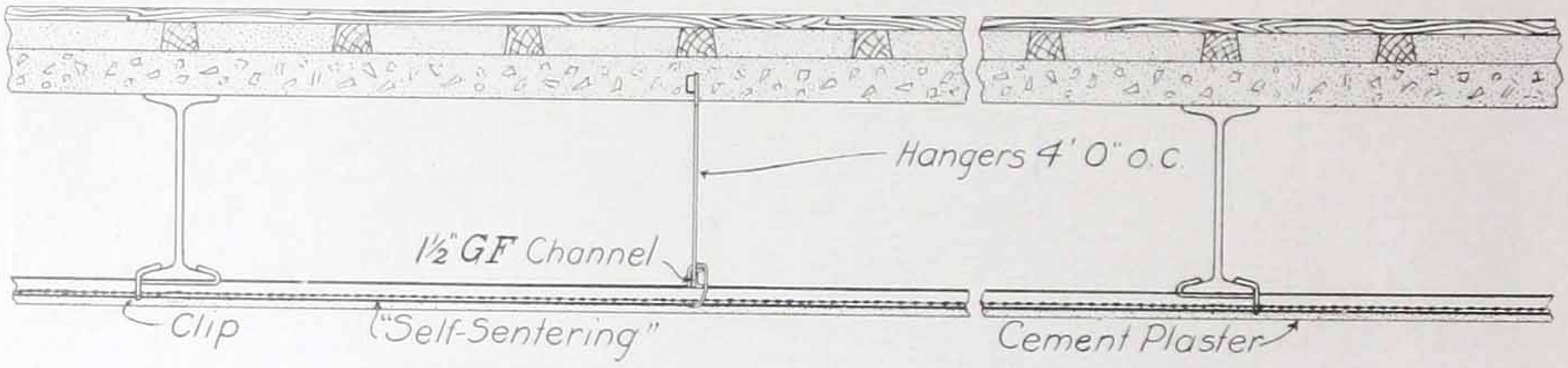
Self-Sentering Suspended Ceiling, Dome Theatre, Youngstown, O.
Architects, Louis Boucherle & Sons



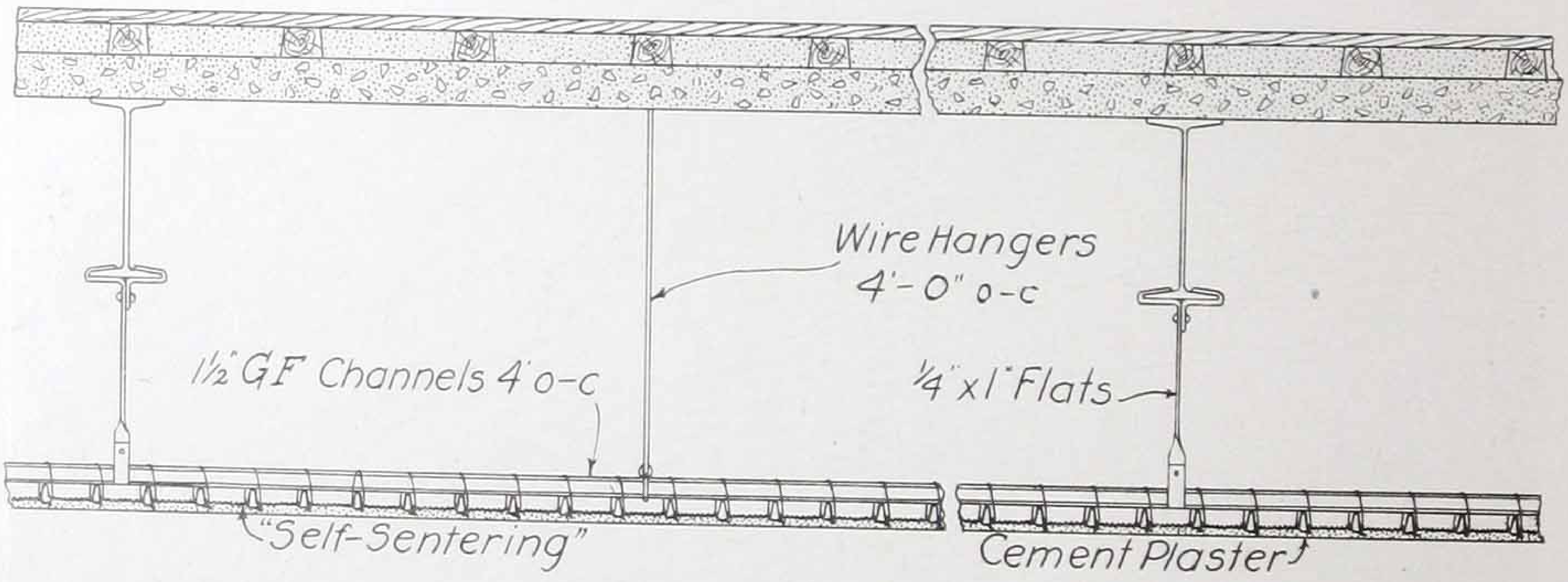
Self-Sentering Suspended Ceilings
Oak Hill High School, Oswego, N. Y.
Architect, L. L. Cope, Oswego



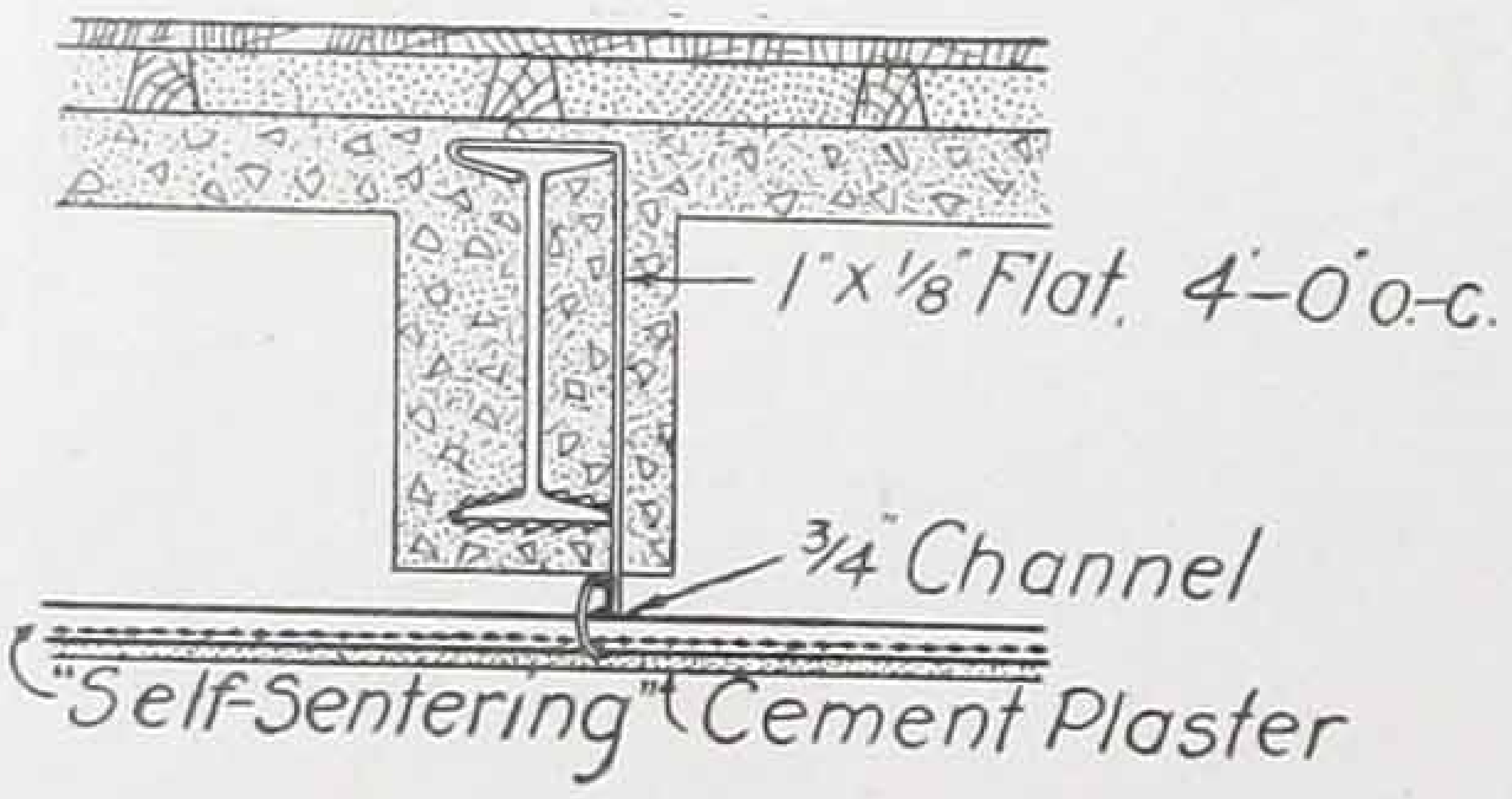
Self-Sentering Ceiling with GF Channels on Steel Beams



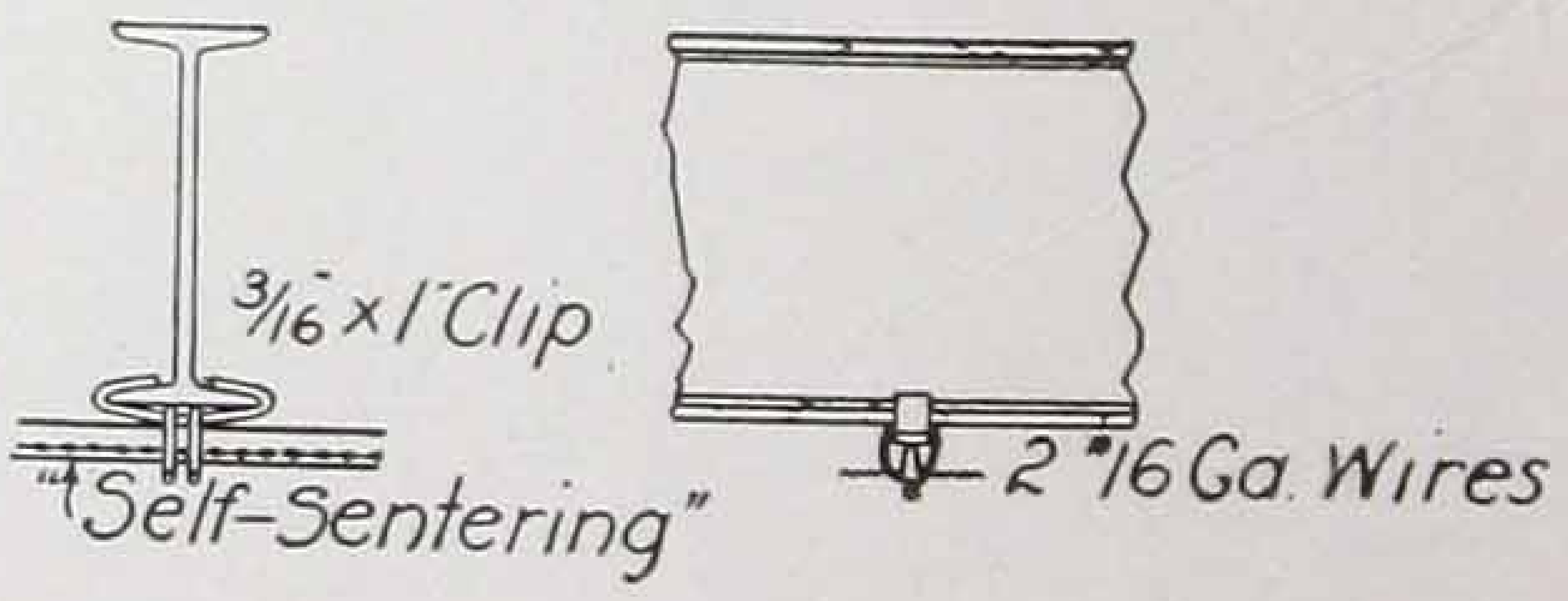
Self-Sentering Ceiling Applied Directly on Steel Beams



Self-Sentering Ceiling Suspended from Steel Beams and Concrete Slab

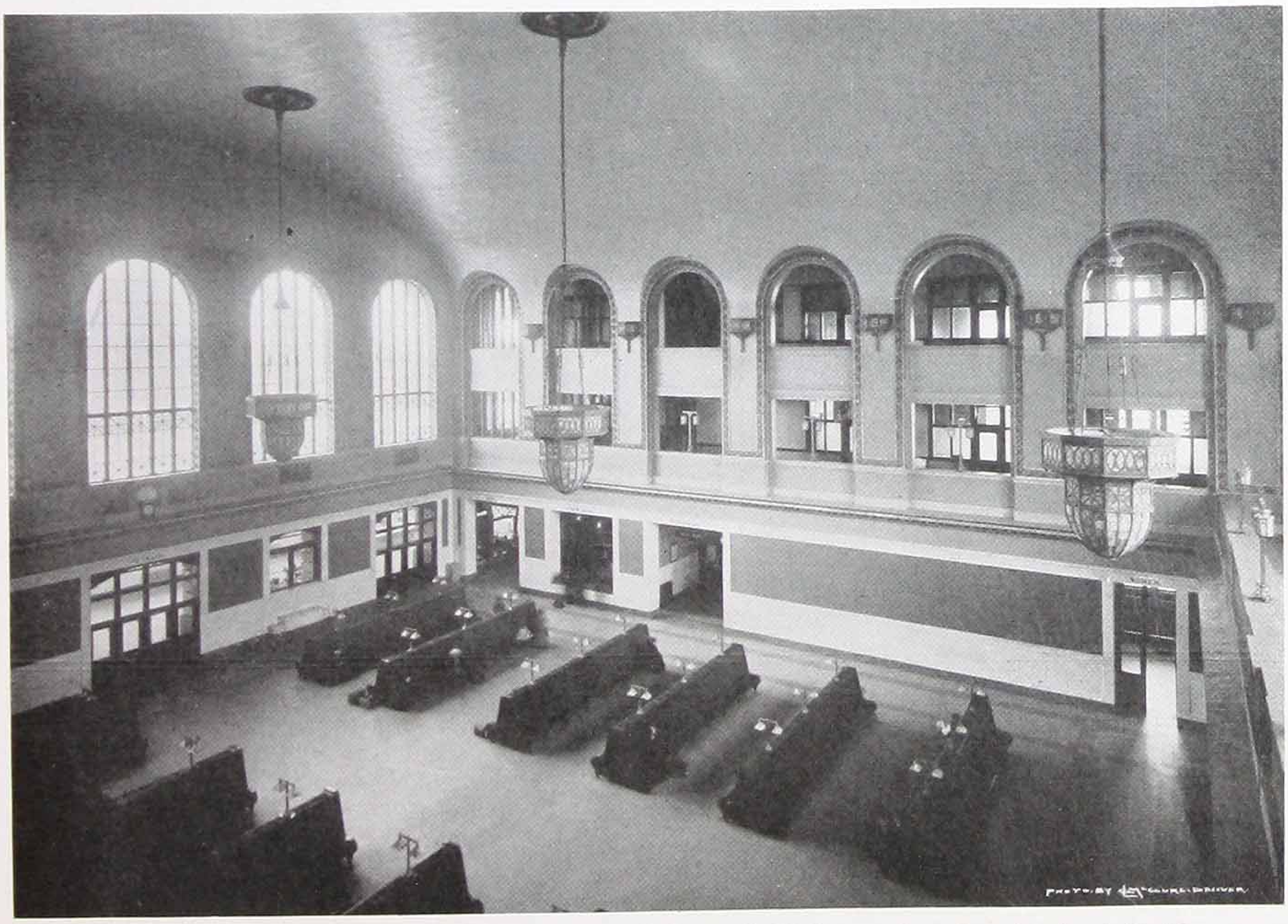


Self-Sentering Ceiling Suspended from Fireproof Steel Beams

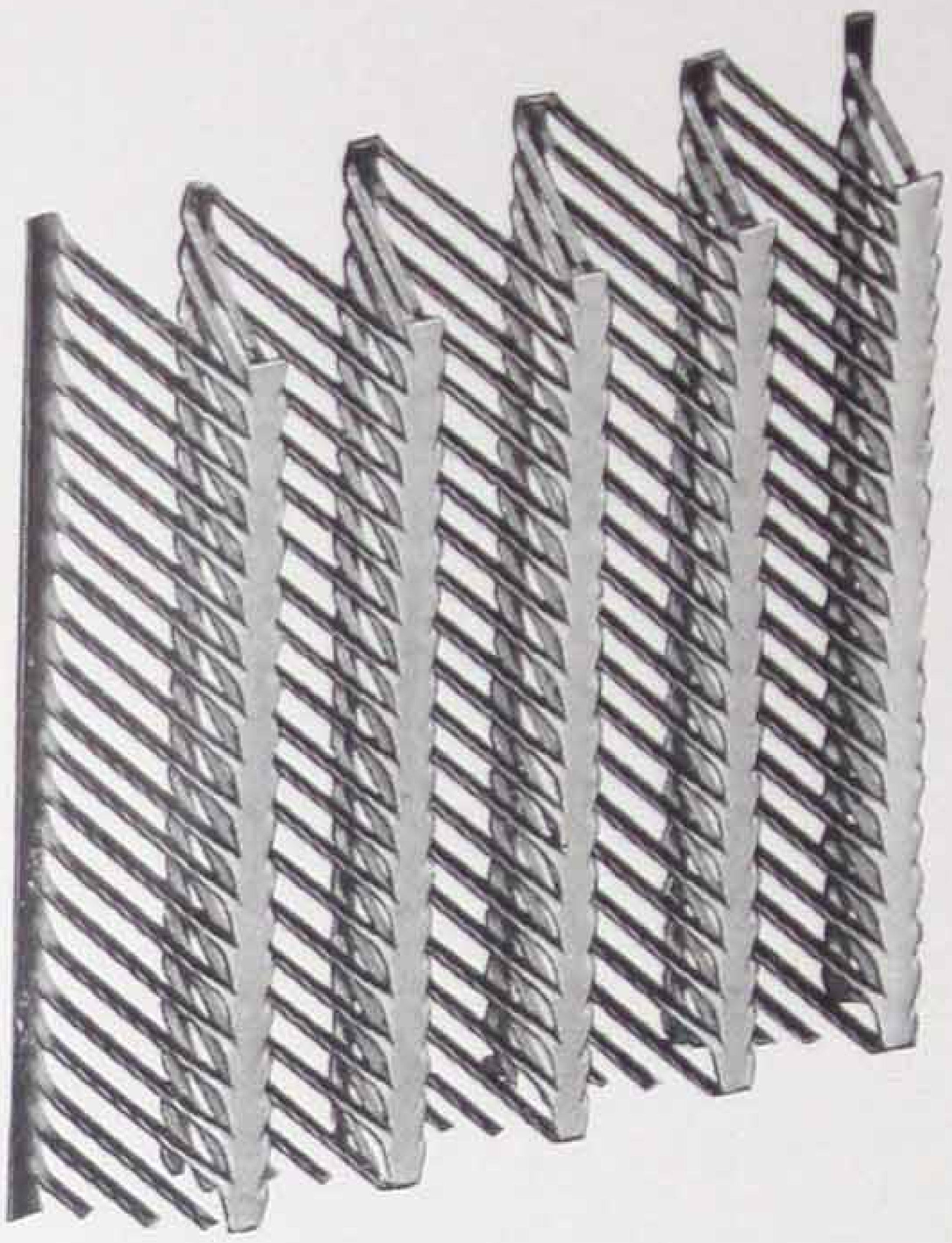


Detail of Clip for Attaching Self-Sentering Direct to Steel Beams for Ceiling Work

Canadian Pacific Railway Building, Toronto, Ont.
Self-Sentering used for all Suspended Ceilings



Union Station, Denver, Colo. "Armco" Iron Self-Sentering for Arched Ceiling.
Architect, Grove & Walsh. Contractor, Stocker & Frazer. Plastering, Anthony Hobson



"Trussit"

Why Trussit?

As manufacturers of various materials we frequently find that we practically compete with ourselves; that is, we make two products used for the same purpose. In such cases, when the choice is left to us, we aim to recommend the material which has the greater advantages in each instance, taking into consideration also the preference of the trade in general. We have now to deal with just such a case.

For side walls and partitions Self-Sentering has numerous advantages and with the exception of Trussit is possibly not equalled by any similar material. The design of Trussit and the advantages inherent in it, however, place Trussit in a class by itself. We are accordingly showing Trussit in the following pages for walls, partitions and similar work and ask that it be borne in mind that Self-Sentering can also be satisfactorily used in every case and that the detail will be practically the same.

"Trussit" is a corrugated expanded steel sheet, for fireproof walls and partitions. The chief advantages for Trussit as a reinforcement of this kind are that it eliminates entirely the use of permanent studding and permits of the erection of partitions but 2 inches in thickness, space saving and wonderfully rigid; curtain walls the equal of brick or poured concrete at practically half their cost. This material is uniformly expanded in both directions, giving equal strength from either side. It is so interwoven back and forth through the cement or plaster that it is not a mere backing for the wall but it is an integral part of it. This uniform distribution of the metal also overcomes any tendency toward expansion or contraction in any one general direction, due to changes of temperature.

Trussit Data

Standard size sheets are 19 inches wide. Trussit is carried in stock in lengths of 8, 10, and 12 feet. Intermediate lengths supplied from stock will be cut from the next longer sheet and waste charged to customer.

Always packed 10 sheets to the bundle. Furnished either painted or galvanized—no unpainted material.

Gauge	Weight per Square Foot	
	Painted	Galvanized
27	.57 lbs.	.68 lbs.
26	.62 lbs.	Not Made
24	.83 lbs.	.88 lbs.

Trussit cut from galvanized sheets can be supplied from stock in 8-foot lengths only. Orders for other lengths will be subject to delays incidental to delivery of sheets from the mill.

Trussit can also be furnished cut from Armco Iron in 8-foot lengths, 27, 26 and 24 gauge, from stock and in other lengths from mill shipment of sheets.

Trussit for Export

Trussit for export is not crated but the ends are securely protected with burlap wrapping and the sheets themselves nest so closely together that the bundle is very compact and readily handled with no danger of damage enroute.

Measurements and weights of bundles for export are as follows, based on standard 8-foot sheets:

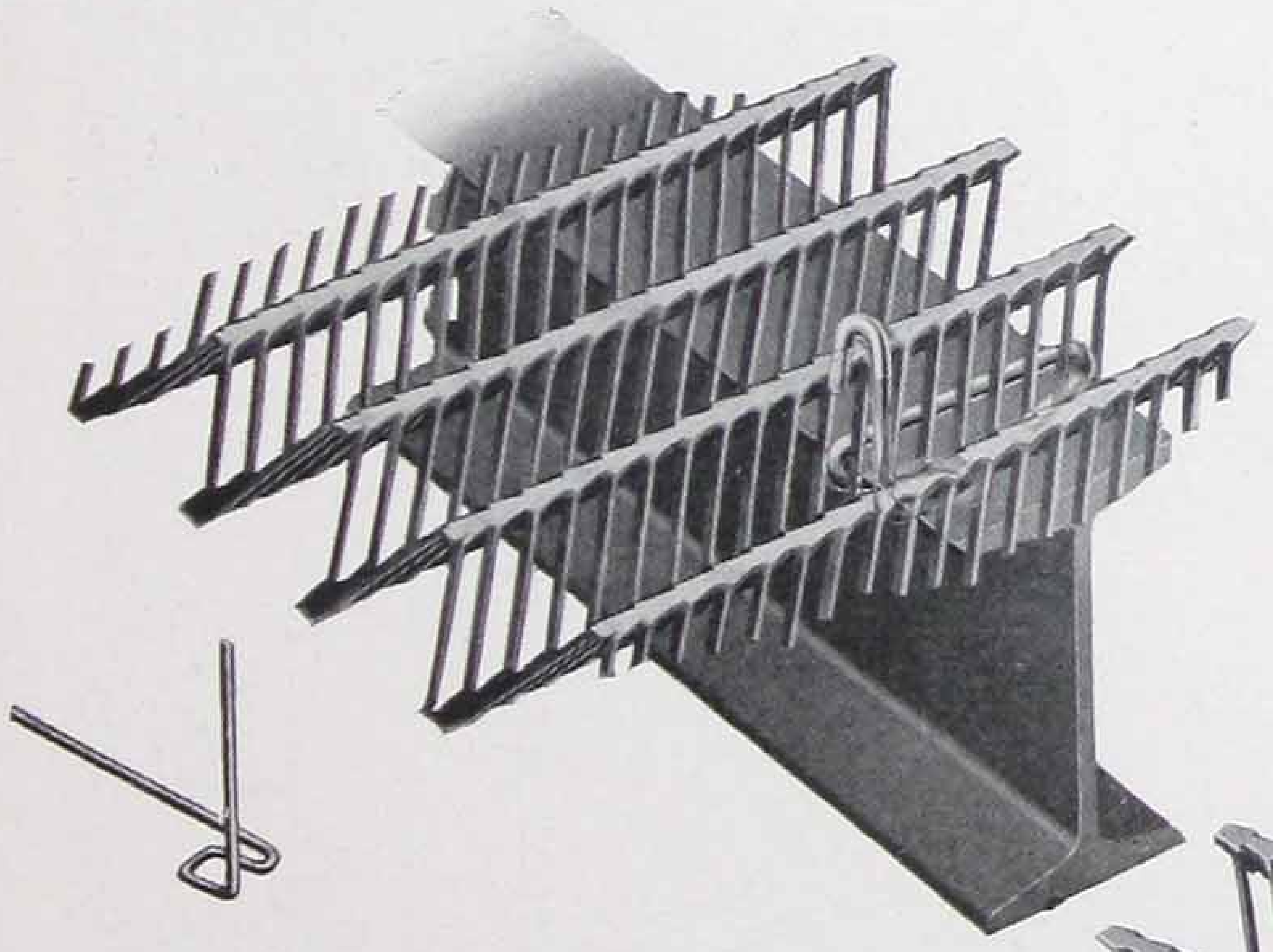
Gauge	No. of Sheets	Cubical Contents	Weight in Lbs.	No. Sq. Ft.
27	20	3.43 Cu. Ft.	150	252
26	20	3.43 Cu. Ft.	163	252
24	15	3.43 Cu. Ft.	163	189

Trussit Clips

Clip No. 3

This clip is used for attaching Trussit to I-beams and channels. When ordering give the size of structural members to be used, or order by following style numbers:

I-beams up to 8 in. and all channels - - - Style 3.55
I-beams 9 in. to 15 in - Style 3.7
I-beams 15 in. to 24 in. - Style 3.9

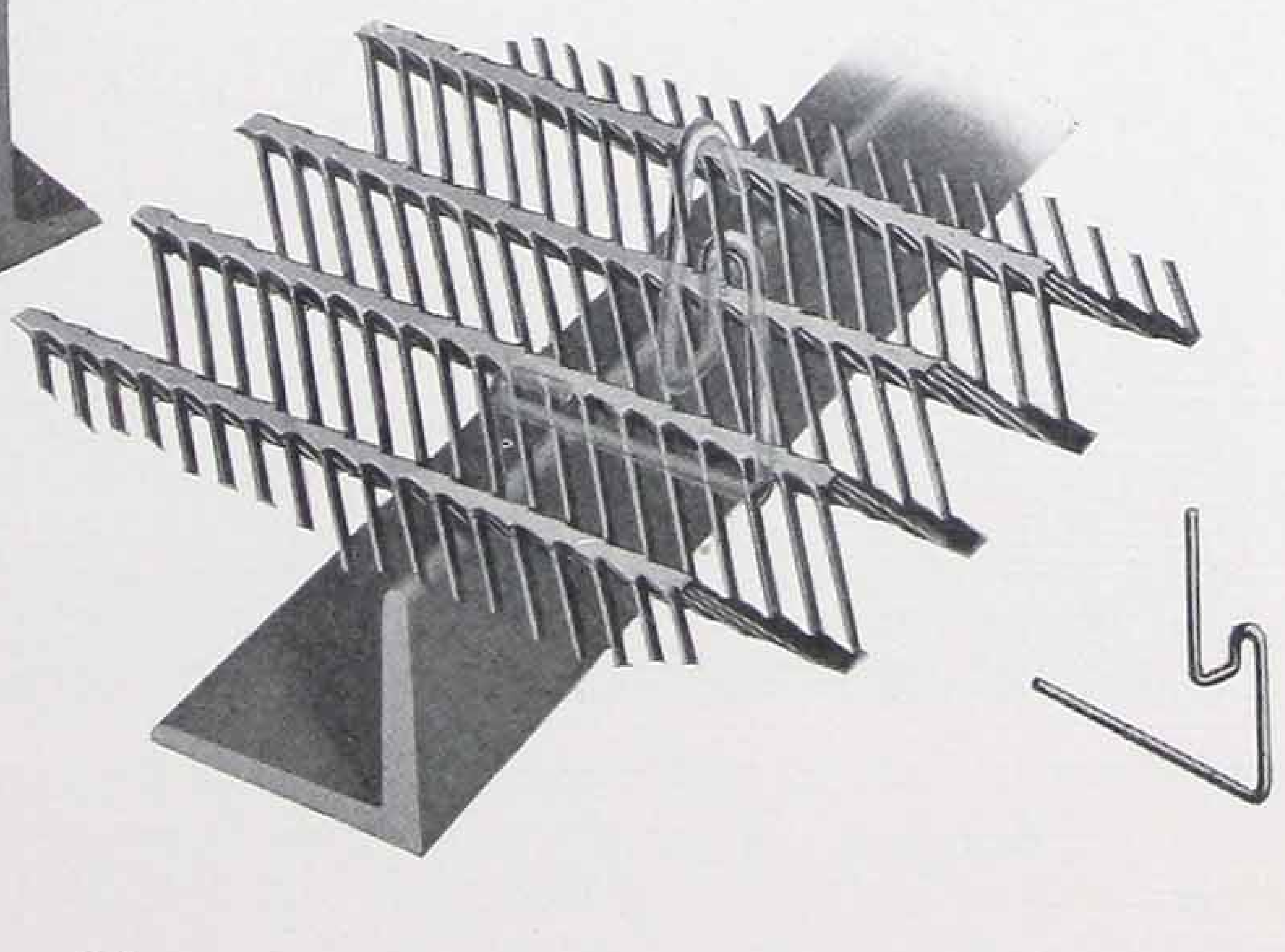


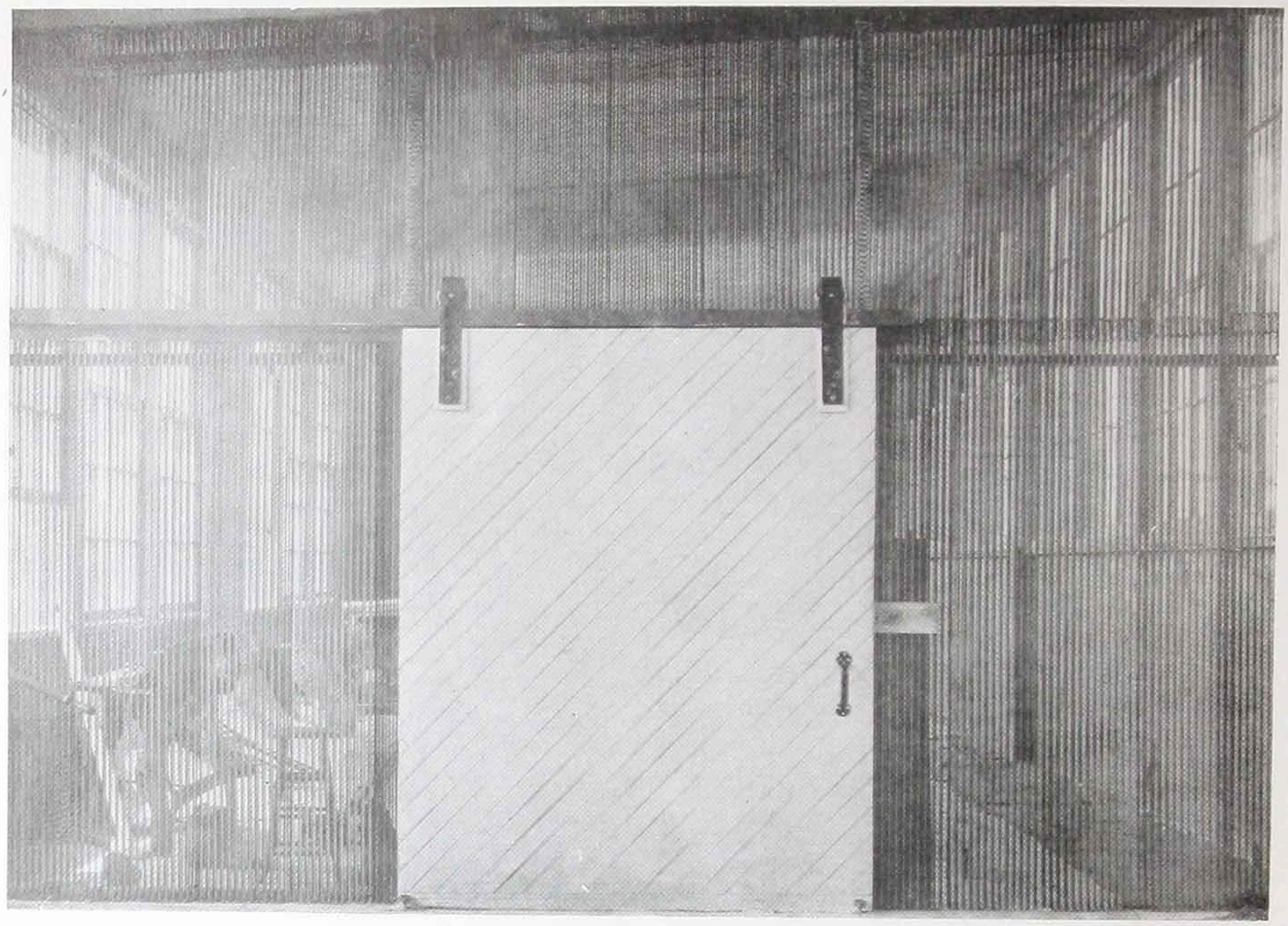
Clip No. 4

This clip is used for attaching Trussit to all angles. Always give the size of angles to be used, or order by following style numbers:

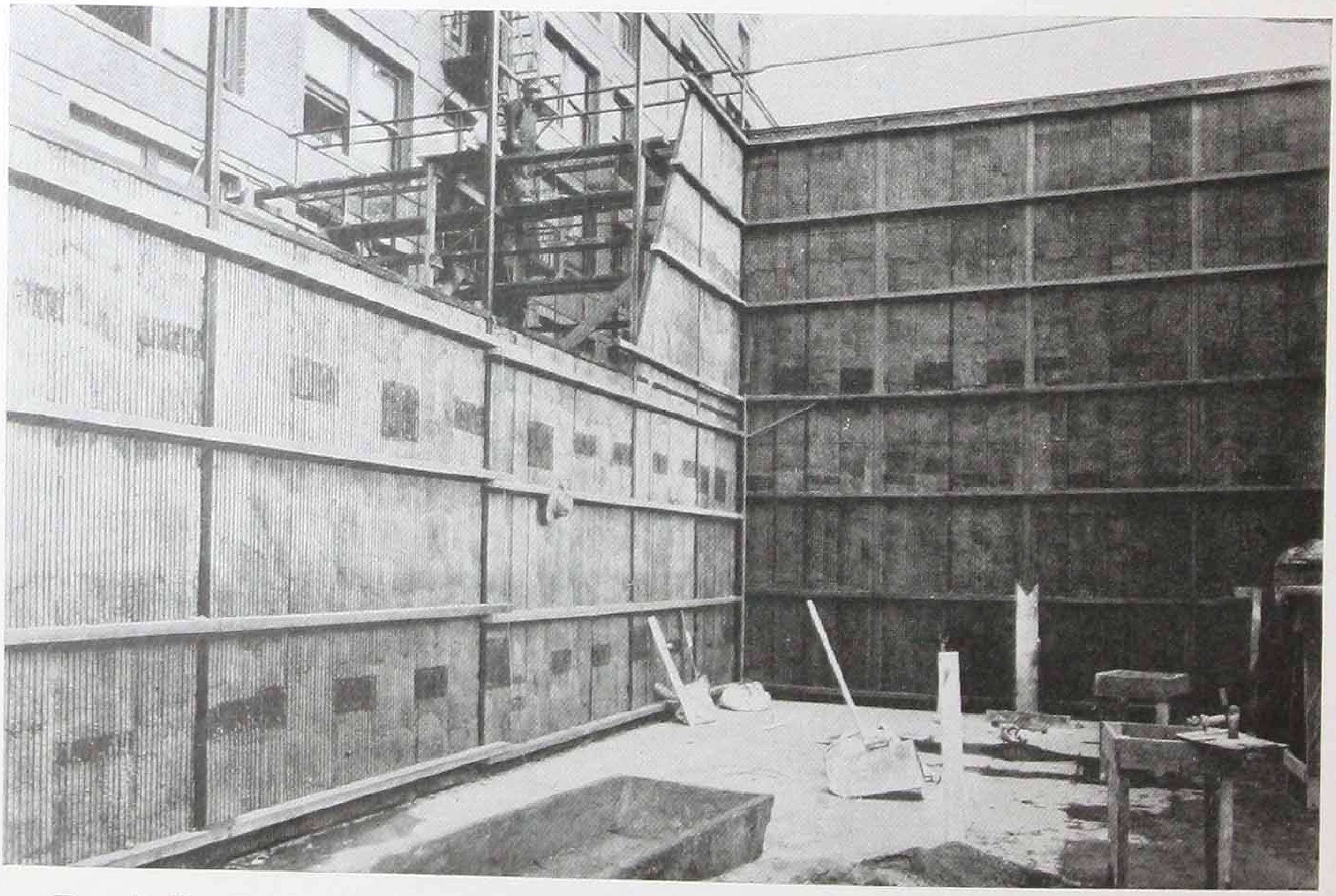
Angles under 3 in. x 3 in. - Style 4.75
Angles over 3 in. x 3 in. - Style 4.10

Both of these clips are made of No. 10 U. S. G. soft annealed wire and are very easy to place.





Trussit Partition Ready for Plaster



Trussit Partitions Forming Hand Ball Courts in the Y. M. C. A. Building at Los Angeles. These Partitions are Twenty Feet High and Fifty Feet Long Note the Simplicity of the Temporary Supports Used

Solid Partitions

TRUSSIT or Self-Sentering is the basis of a solid partition erected without the use of studs. These partitions show maximum strength and rigidity with minimum weight, embody simplicity of construction by eliminating permanent studding and have a wide range of adaptability for all classes of buildings.

Trussit or Self-Sentering is especially suitable for solid partitions in storerooms, office buildings, warehouses, factories, machine shops and general mercantile buildings; also extensively used for elevator and air shafts.

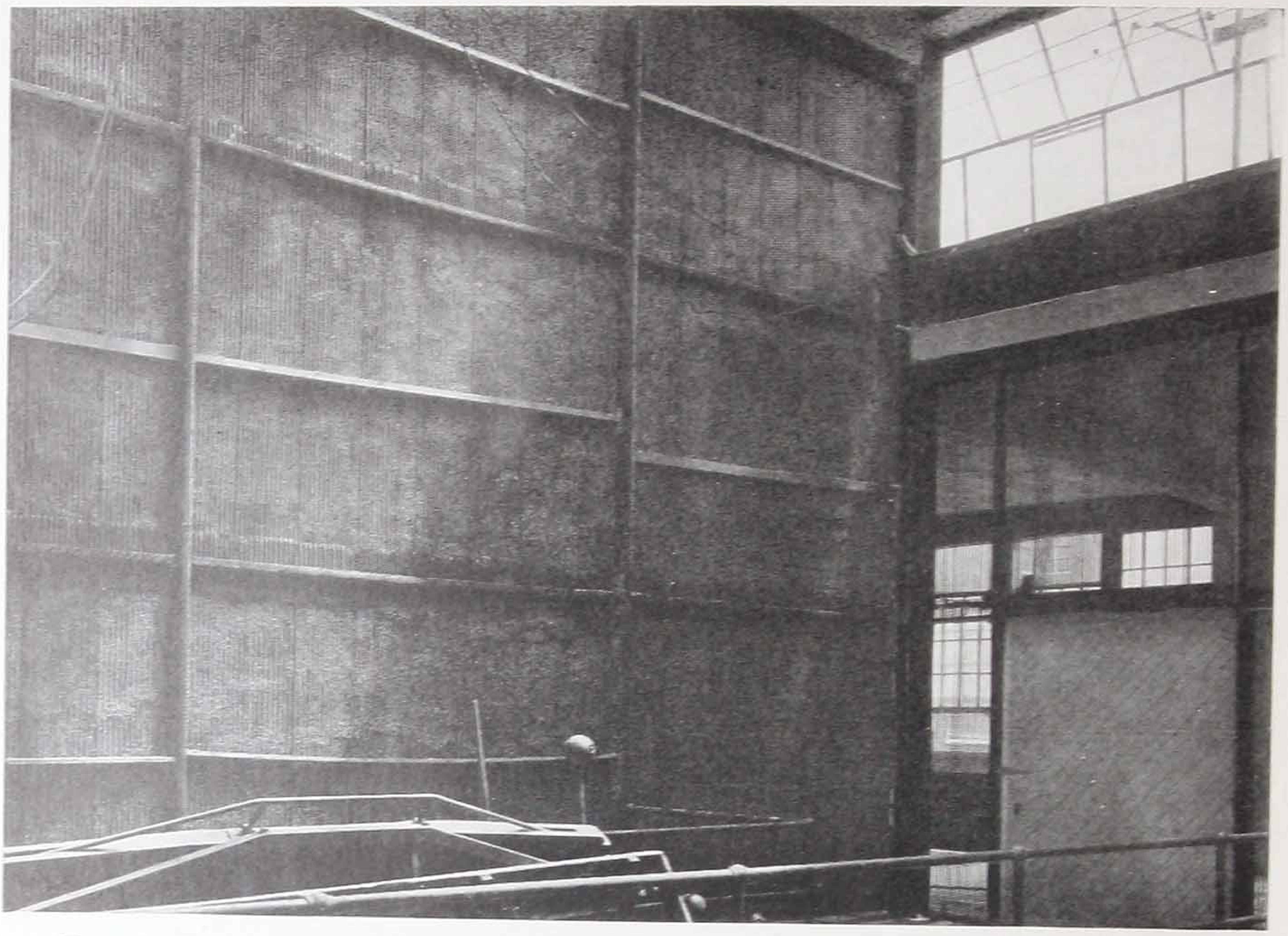
The use of Trussit or Self-Sentering in solid partition construction gives a wall 1½ inches thick, or as much thicker as desired, constructed without permanent studding of any character, yet making an absolutely fireproof plastered partition. Statistics from recent large conflagrations show that solid partitions are of the most durable type, even when exposed to intense heat.

The space saving features of such a partition cannot be overestimated. When compared with the ordinary 6-inch partition, a Trussit or Self-Sentering partition means a saving of one square foot of floor space to every three lineal feet of partition. In office buildings, where floor space is worth from $1.50 to $3.50 per square foot, this means a sufficiently increased income to pay for the partition outright in a short time, and what is more, this increased income comes in, not only the first year, but every year thereafter.

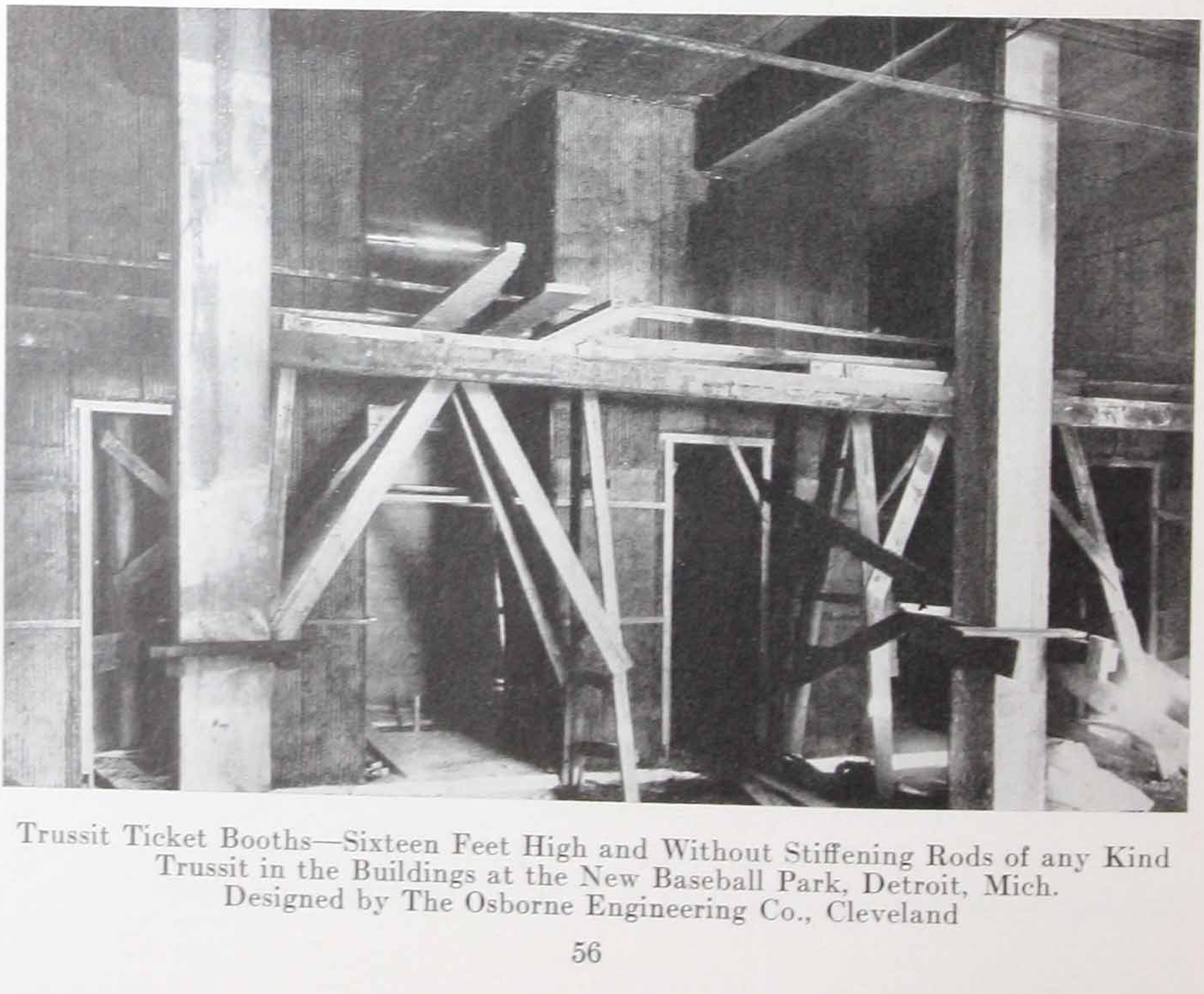
In factories, warehouses or any industrial buildings, this increased floor space furnished, as it is, at no increased cost, often is just enough to mark the difference between efficient and non-efficient arrangement of the building's contents.

Trussit or Self-Sentering partitions are economical partitions. The temporary studding required in their erection can be placed very much more rapidly than permanent studding, while the cost is merely nominal, as it is possible to use it over and over again. There is absolutely no waste of plaster, as the first coat applied forms the foundation for the second coat, to be applied on the reverse side. The economy of the construction has made it a great favorite with the building trades throughout the country.

Methods of erection of Trussit or Self-Sentering partitions under varying conditions are described in detail in the following pages.



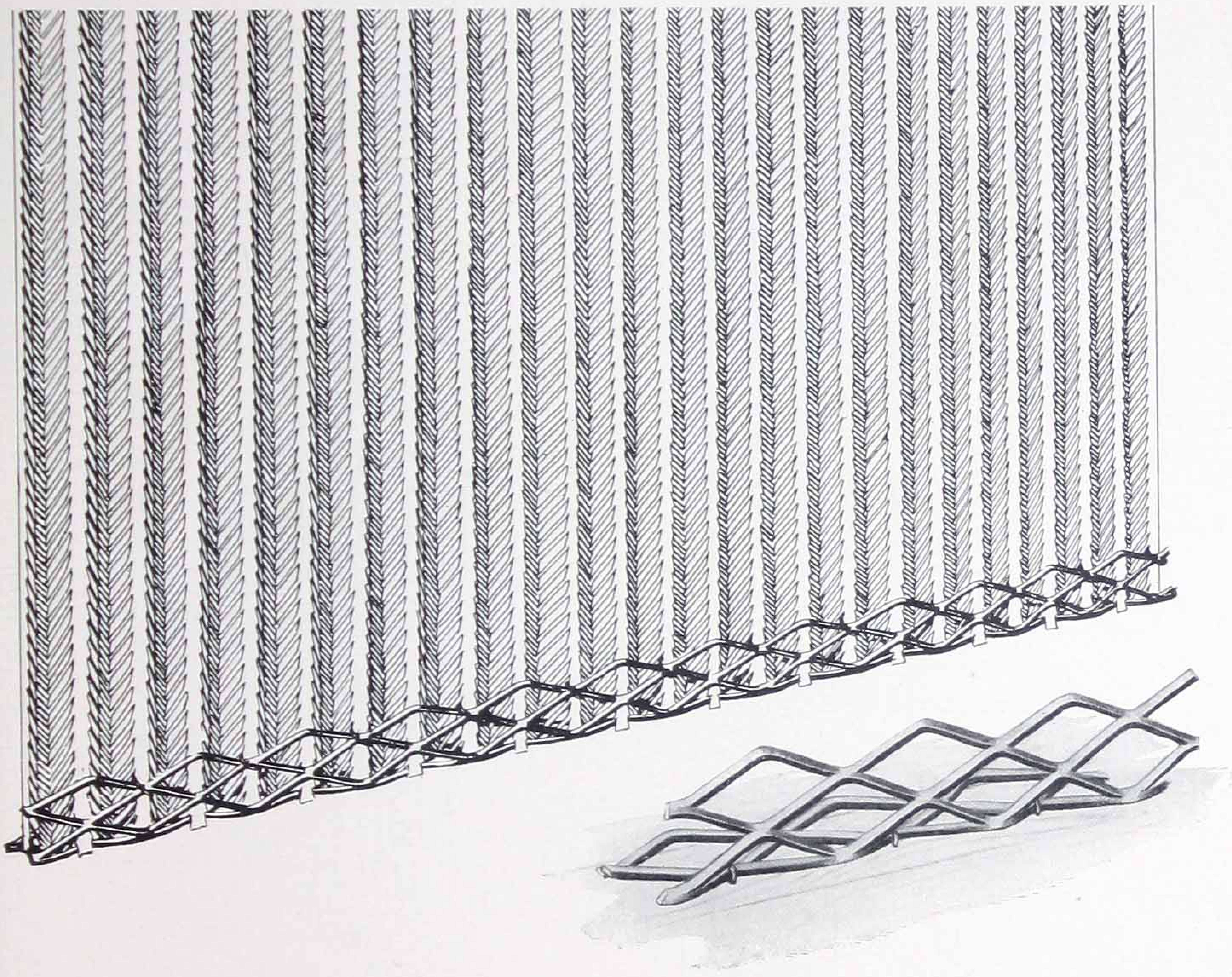
Trussit Partitions—Machine Shop, The Republic Rubber Co., Youngstown, O.
Engineers, The Osborne Engineering Co., Cleveland, O.



Trussit Ticket Booths—Sixteen Feet High and Without Stiffening Rods of any Kind
Trussit in the Buildings at the New Baseball Park, Detroit, Mich.
Designed by The Osborne Engineering Co., Cleveland

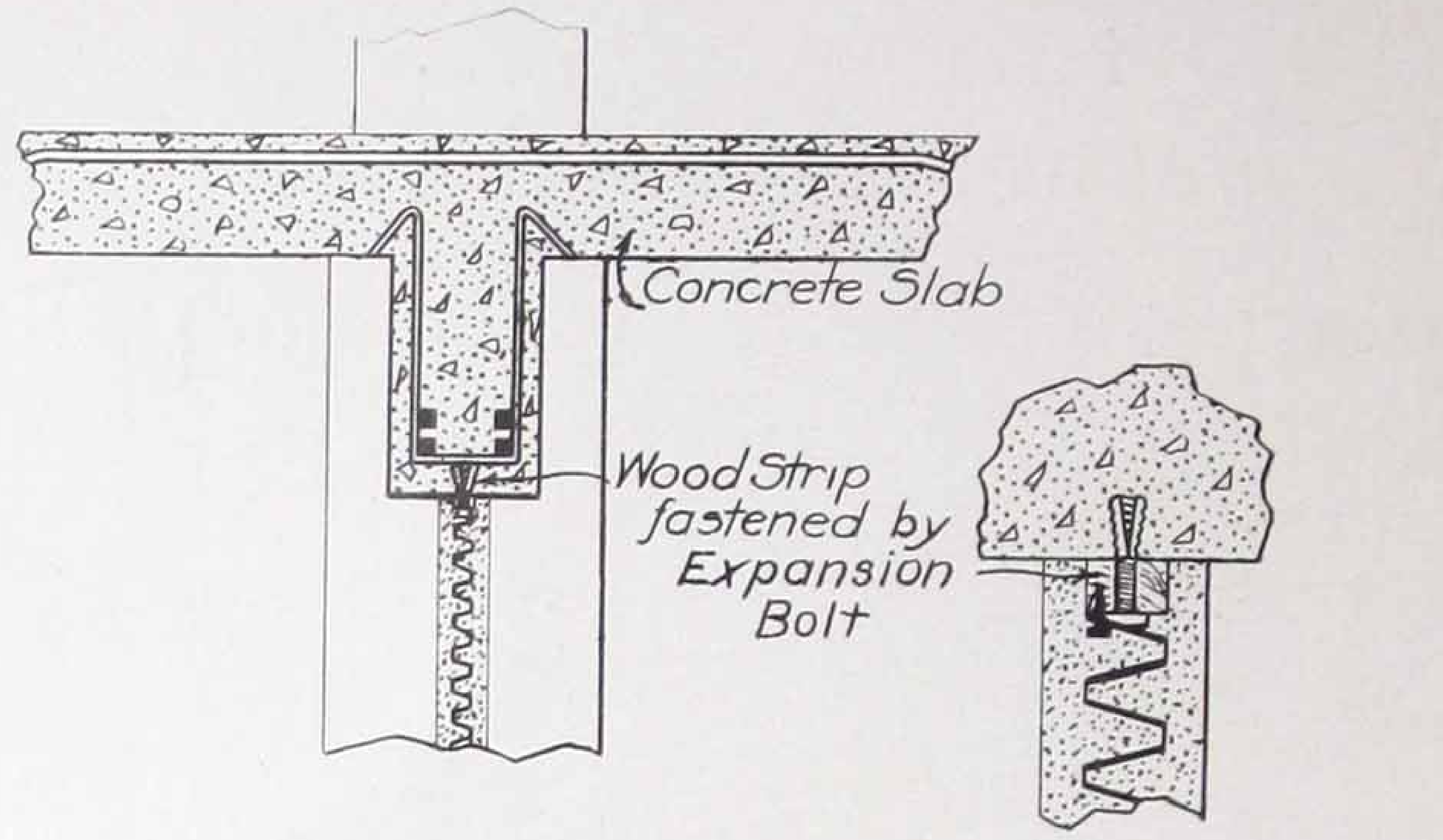
Expanded Metal Angle

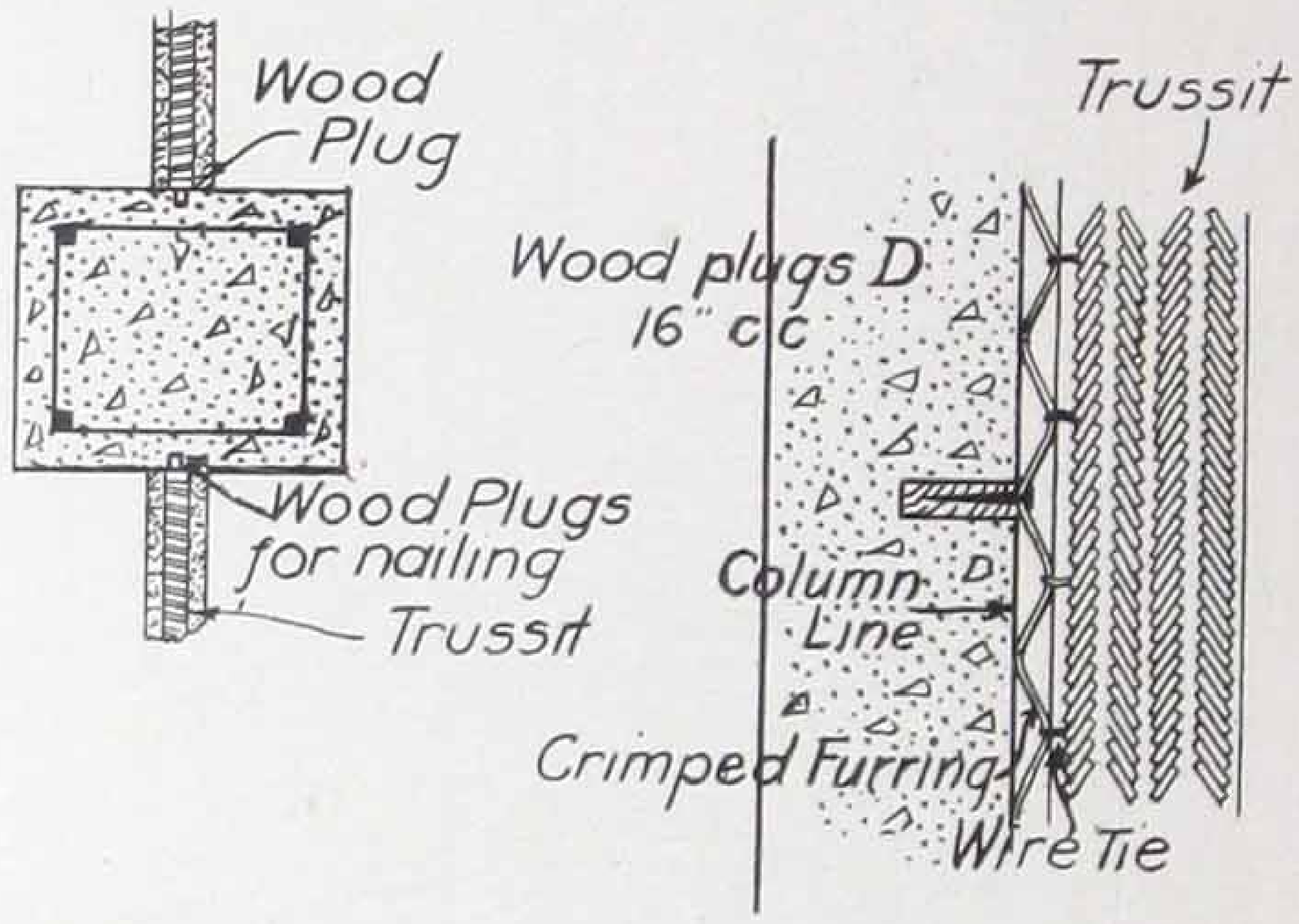
For Attaching Trussit to Floor or Ceiling

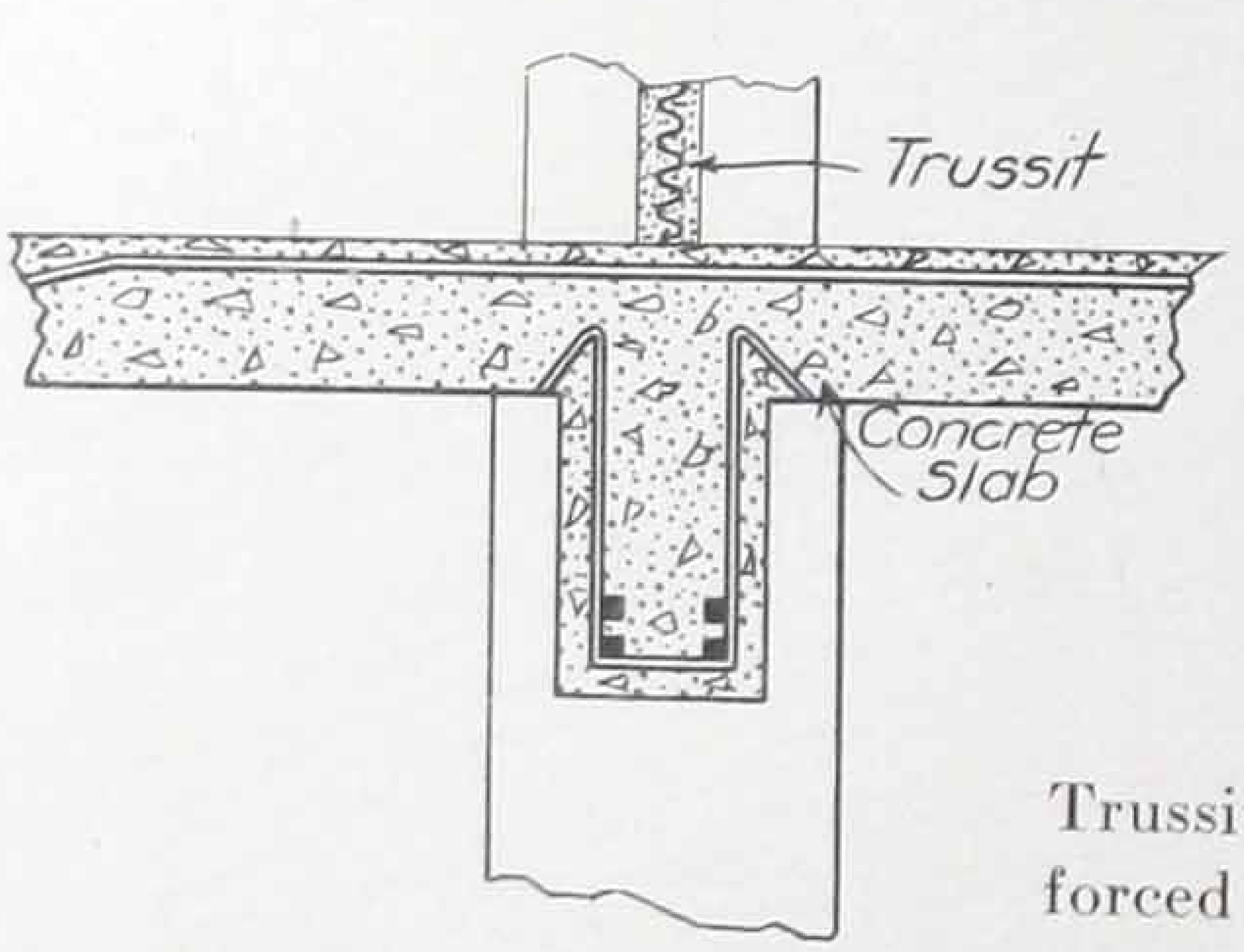


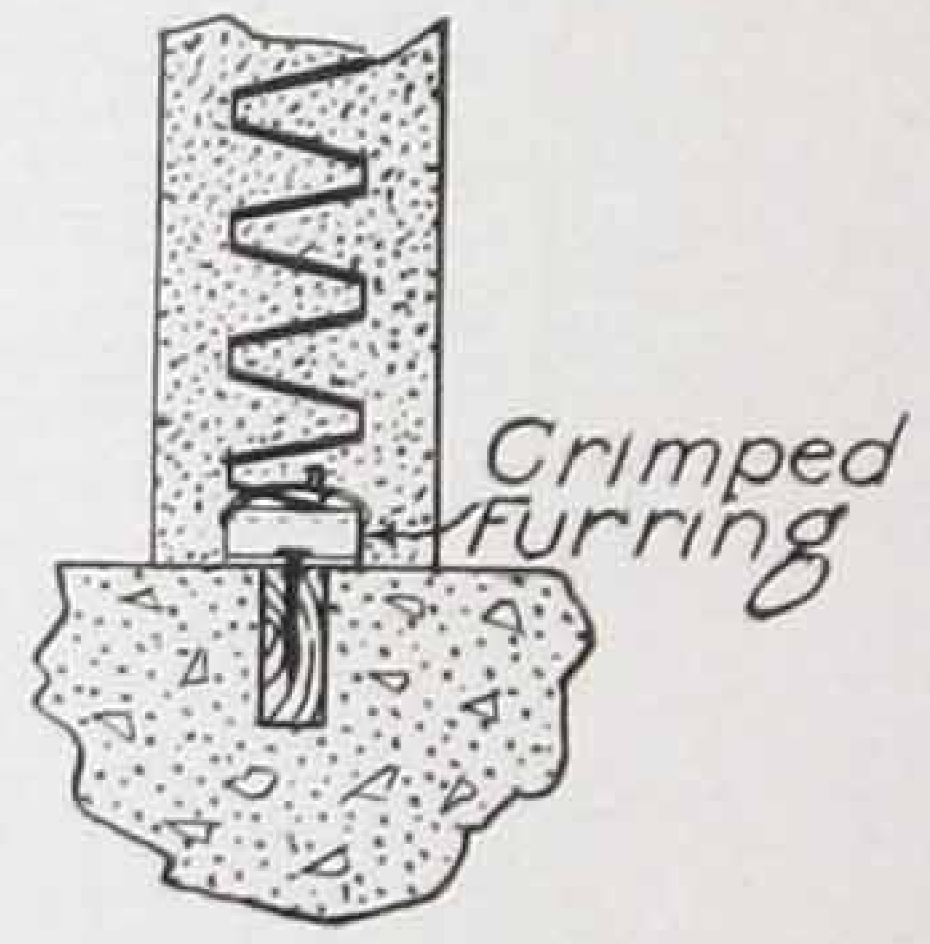
This offers the simplest and most efficient method of attaching Trussit to floor and ceiling. The Expanded Metal Angle is made from No. 13 gauge steel and furnished in lengths up to 8 feet. The meshes are ¾ inch wide by 1½ inches long. The angle is merely laid along the line of the proposed partition, stapled to the floor every three feet and the Trussit wired securely to the other leg of the angle. This angle offers no obstruction to the plaster; it is merely imbedded in it and becomes an integral part of the partition, making the fastening absolutely permanent.

There are a number of other methods used for this class of work, however, and the best of these are shown in the following pages.

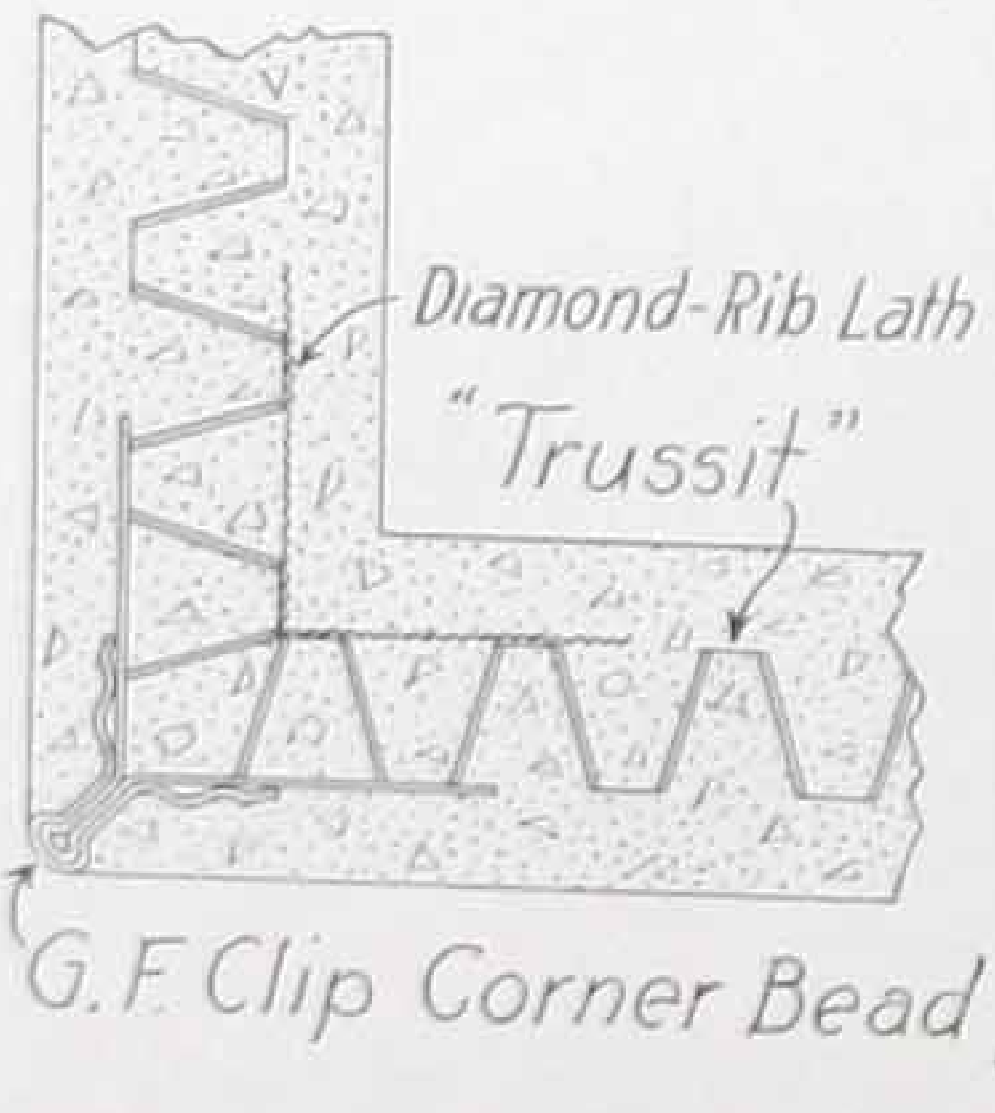




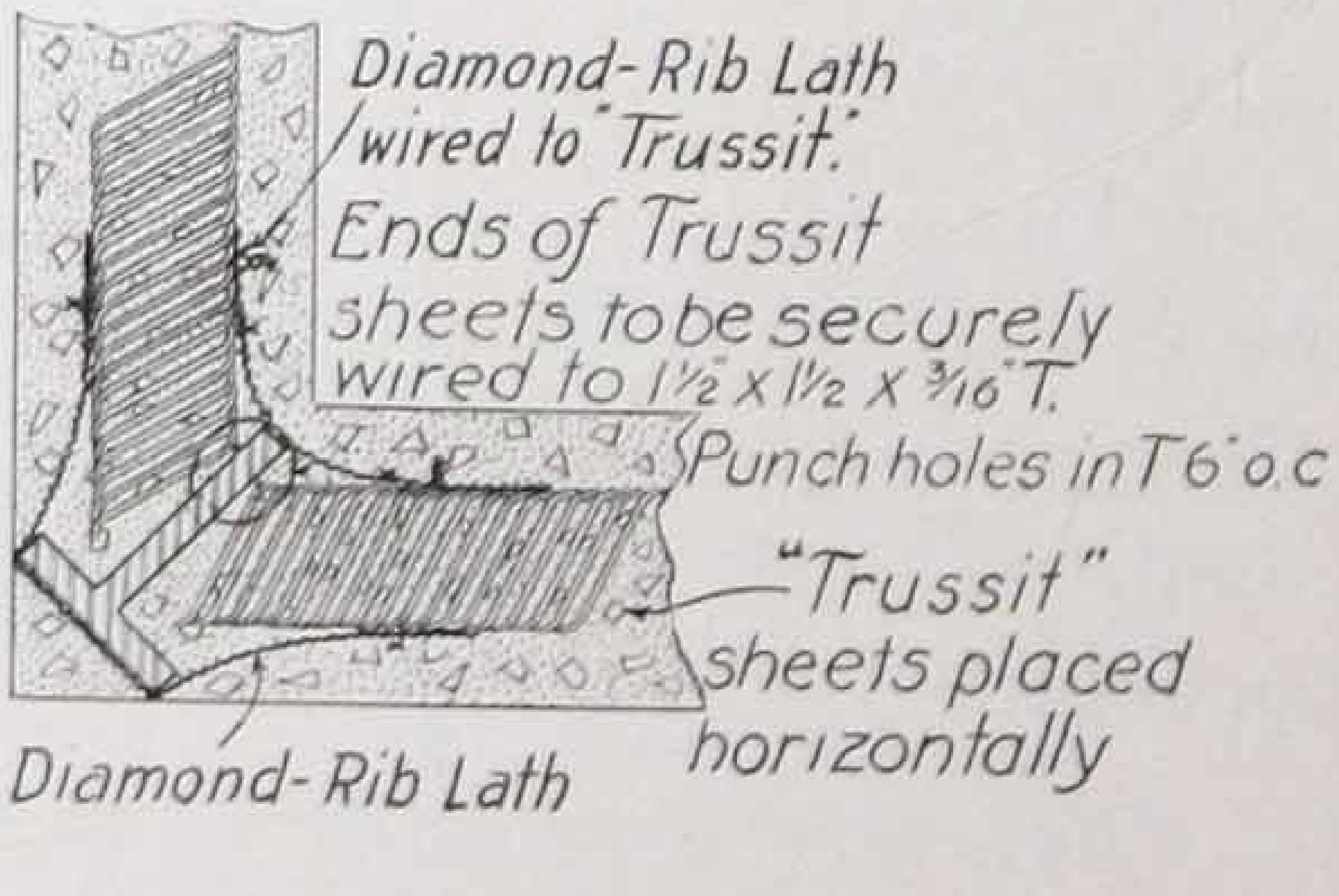




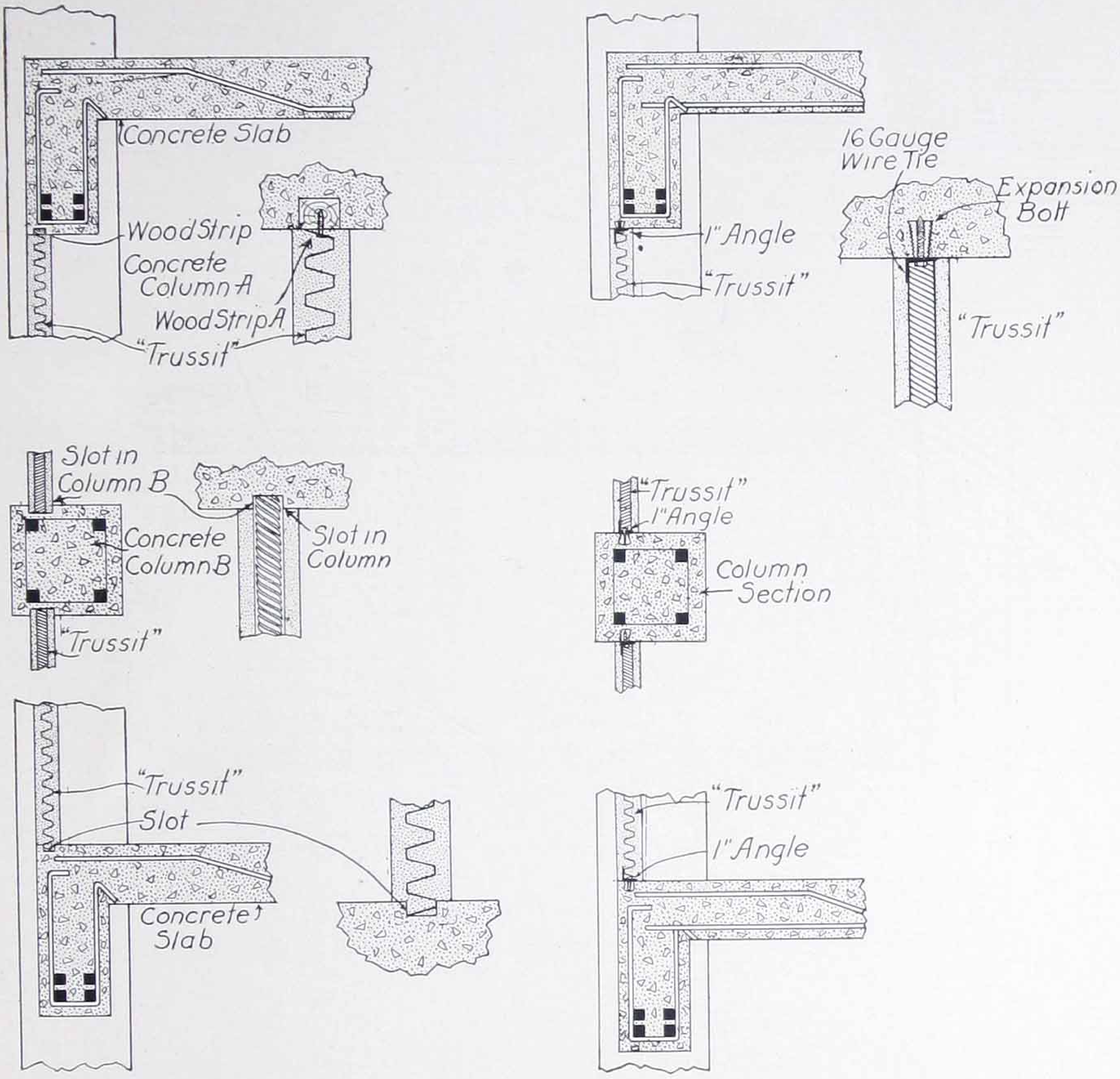
Trussit Partitions in Reinforced Concrete Buildings



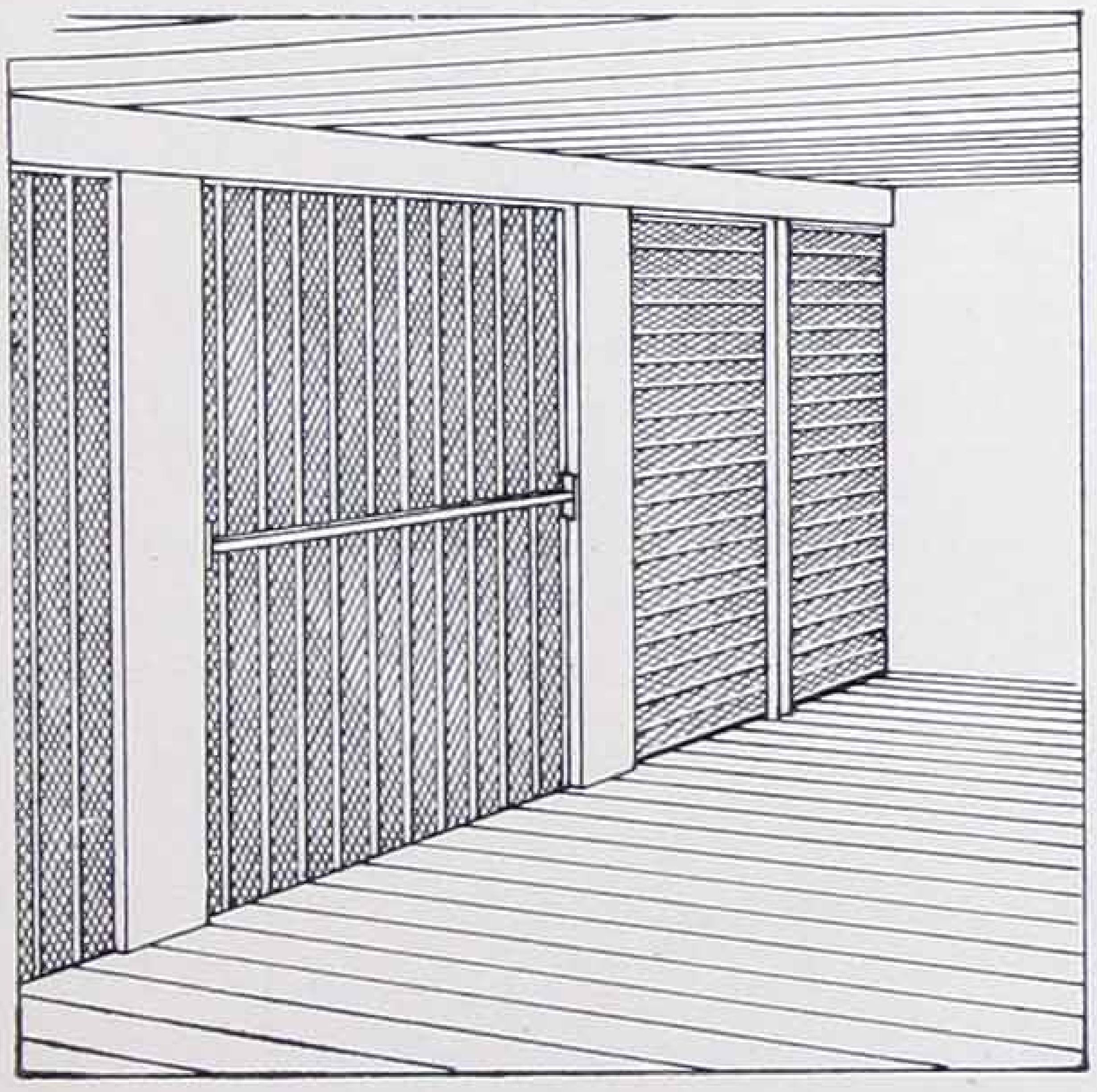
Framing for Exposed Corners on Trussit Partitions

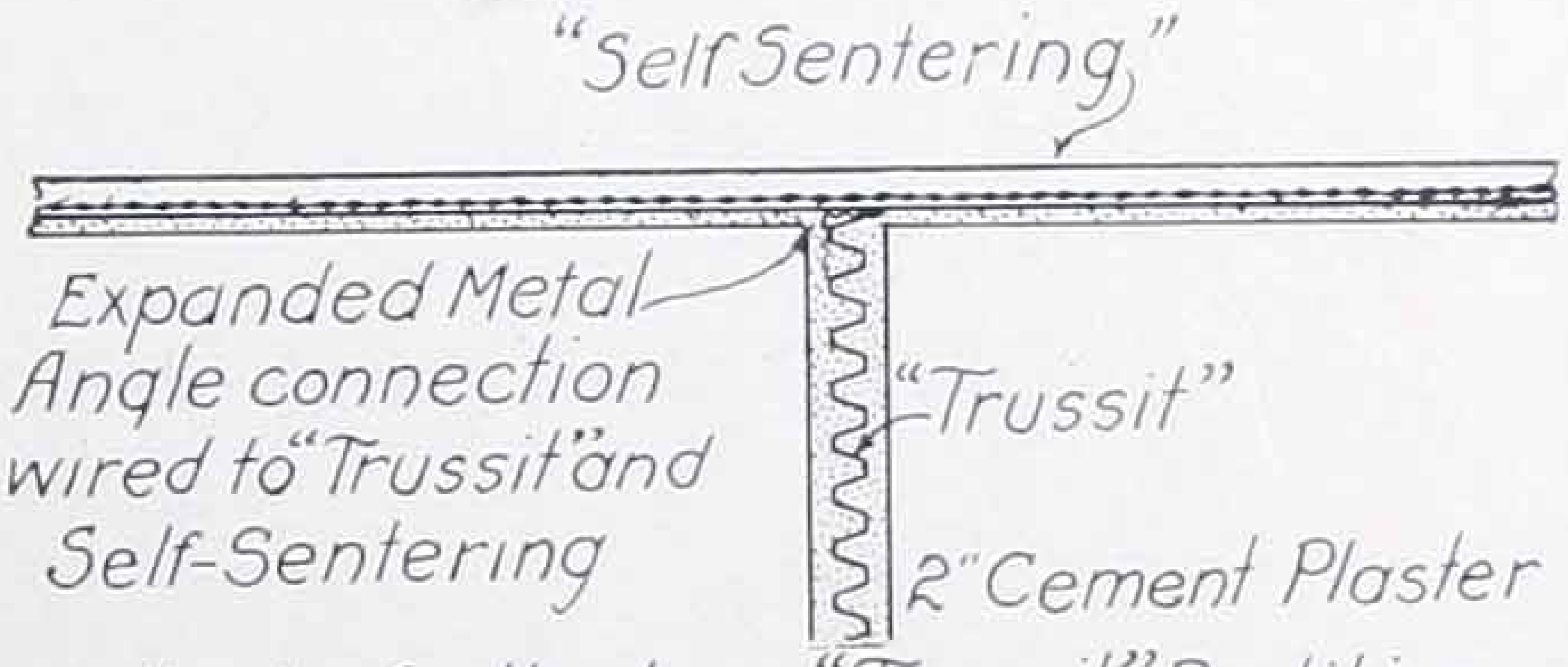

Diamond-Rib Lath wired to "Trussit."
Ends of Trussit sheets to be securely wired to 1½ x 1½ x 3/16" T.
Punch holes in T 6" o.c
"Trussit" sheets placed horizontally
Diamond-Rib Lath

Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail



Partition Details with Trussit in Reinforced Concrete Buildings

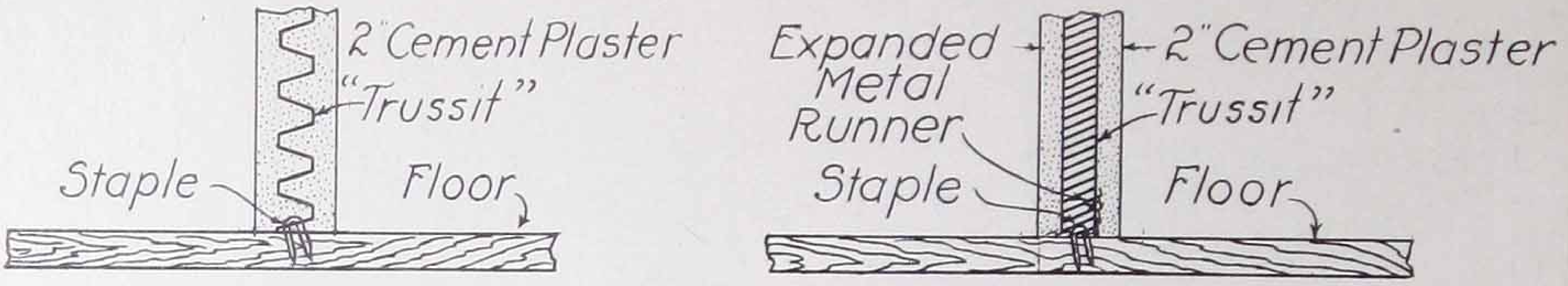




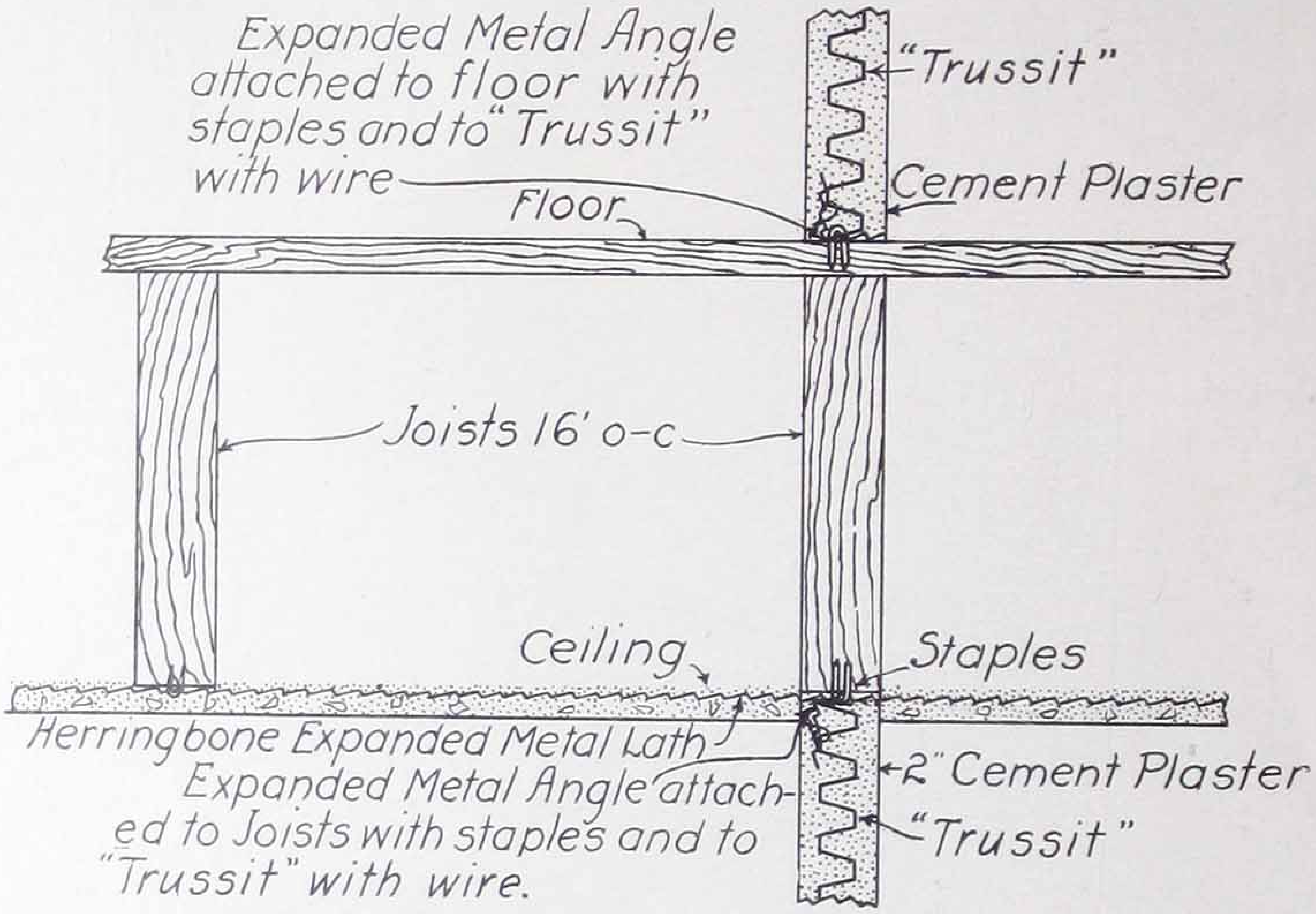
Method of attaching "Trussit" Partition to suspended ceiling

Temporary Bracing of Trussit Partitions
If Supports are too far Apart to be Spanned by One Brace, the Horizontal Braces may be Braced from the Floor

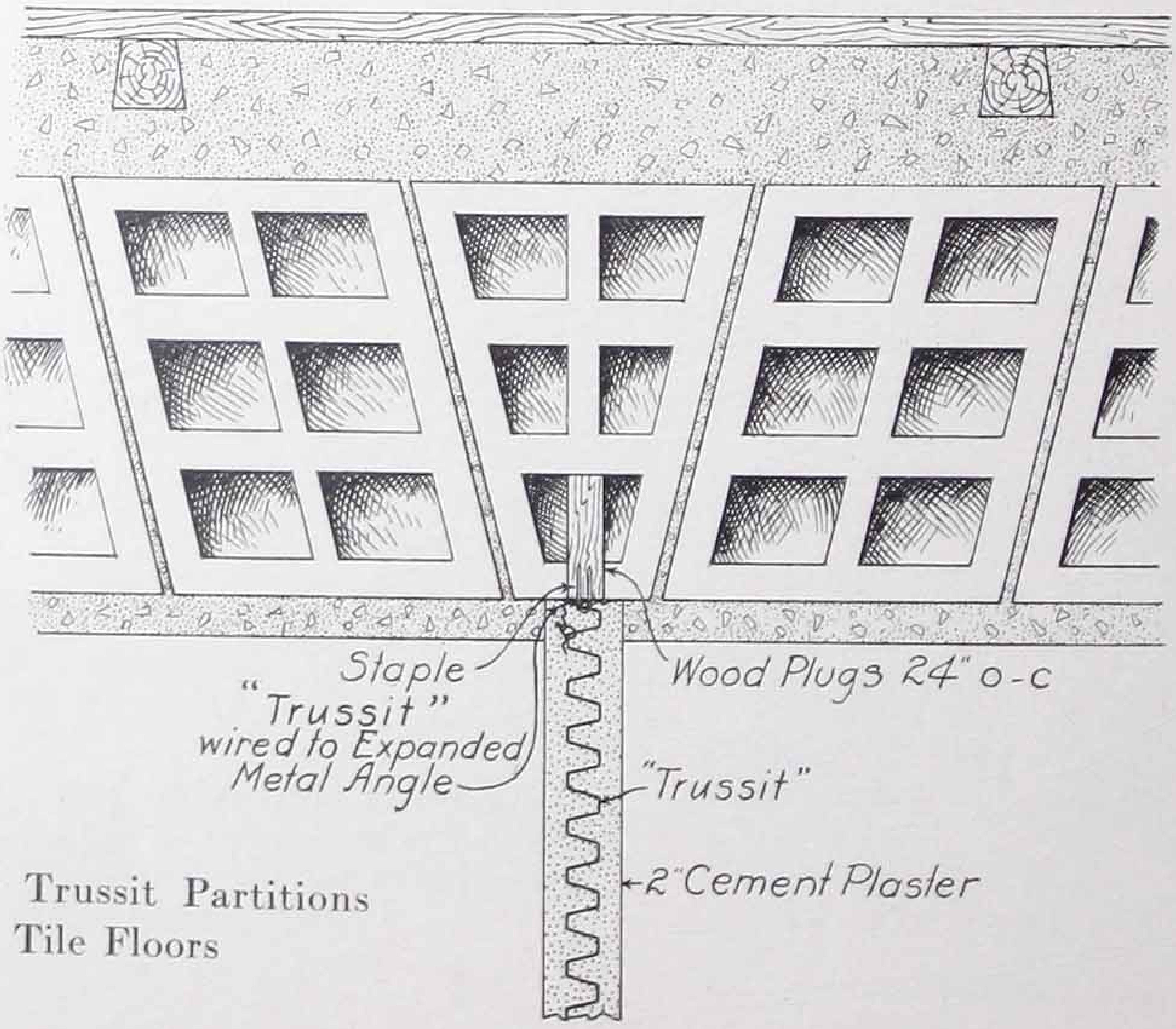
Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail



Attaching Trussit Partitions Direct to Wood Floor

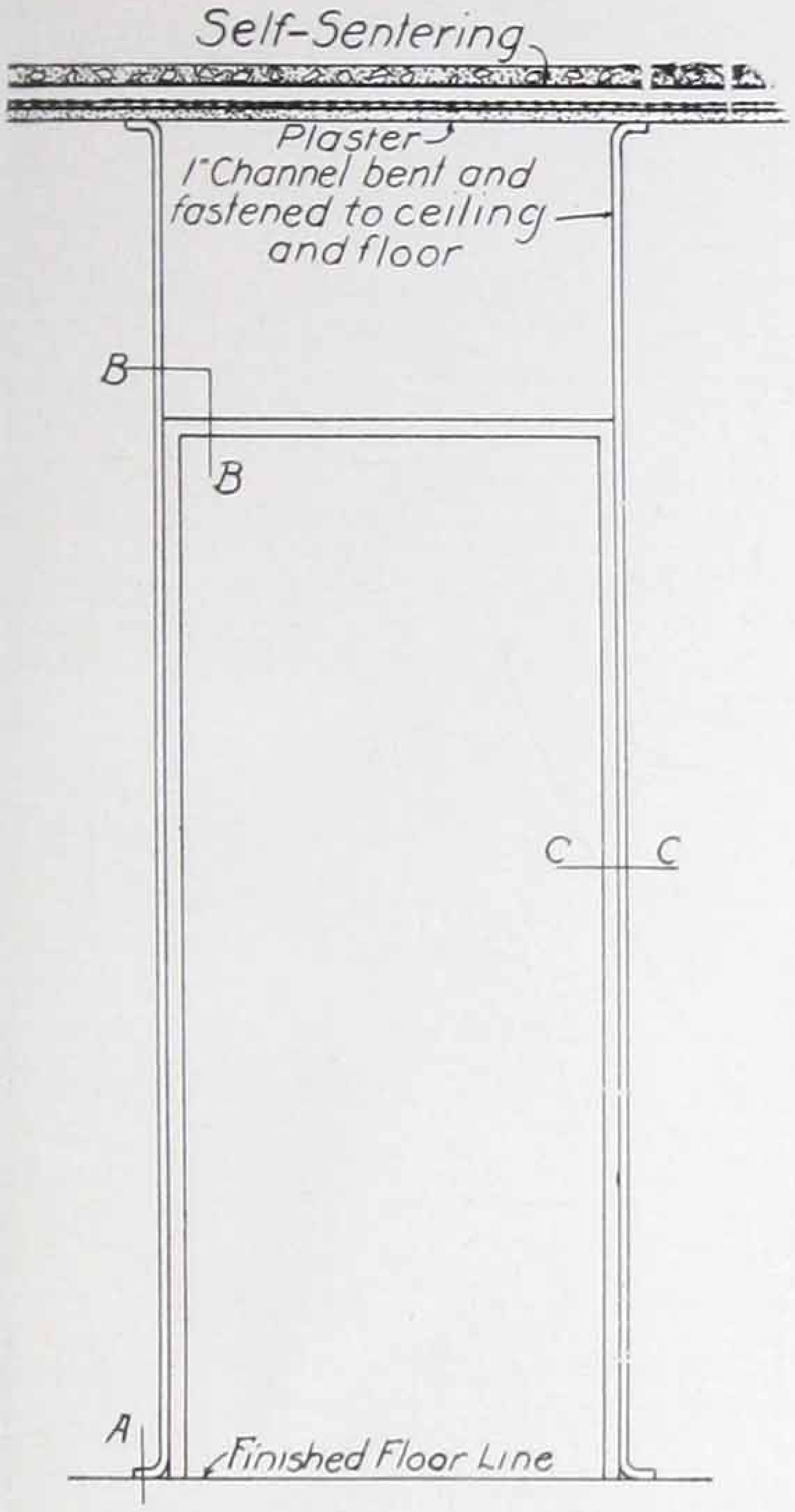

Expanded Metal Angle attached to floor with staples and to "Trussit" with wire
Floor
"Trussit"
Cement Plaster
Joists 16' o-c
Ceiling
Staples
Herringbone Expanded Metal Lath
Expanded Metal Angle attached to Joists with staples and to "Trussit" with wire.
2" Cement Plaster
"Trussit"

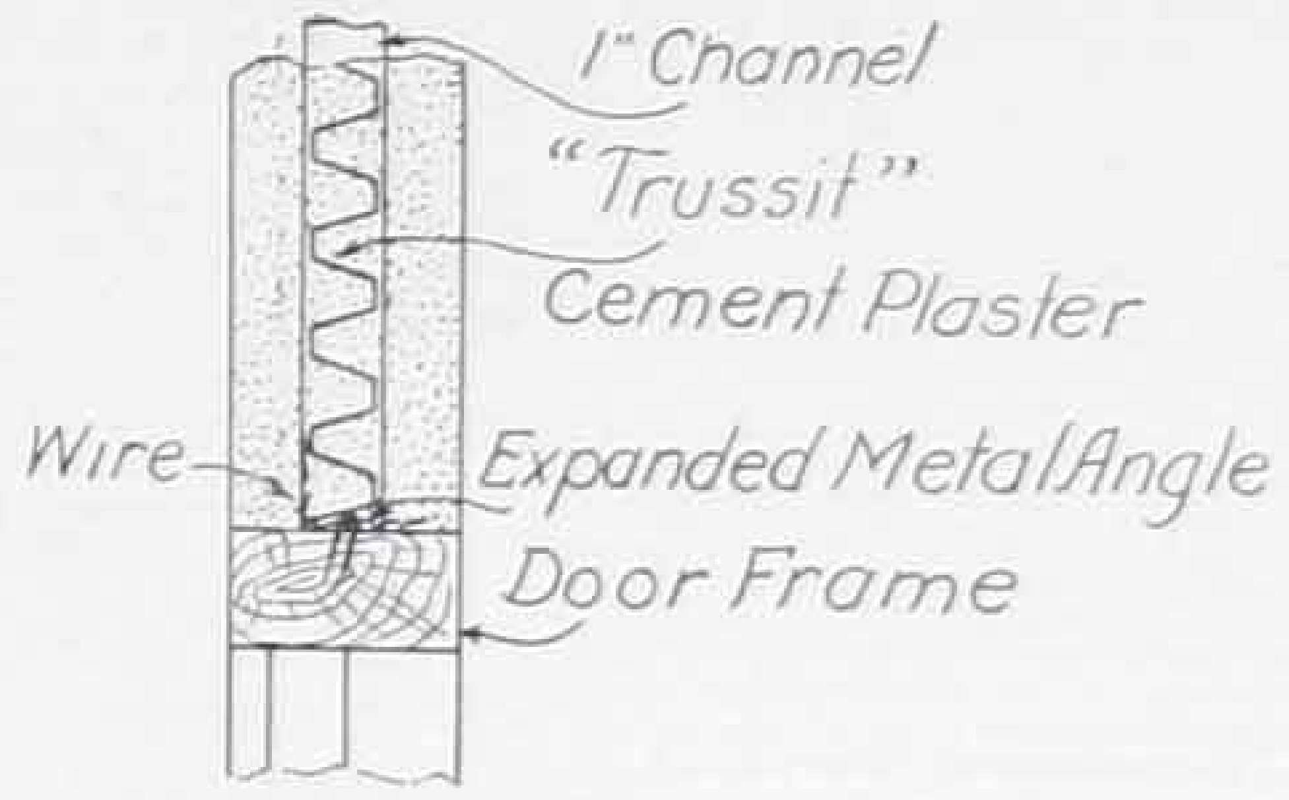
Attaching Trussit Partitions to Wood Floor and Ceiling Joists with Expanded Metal Angle



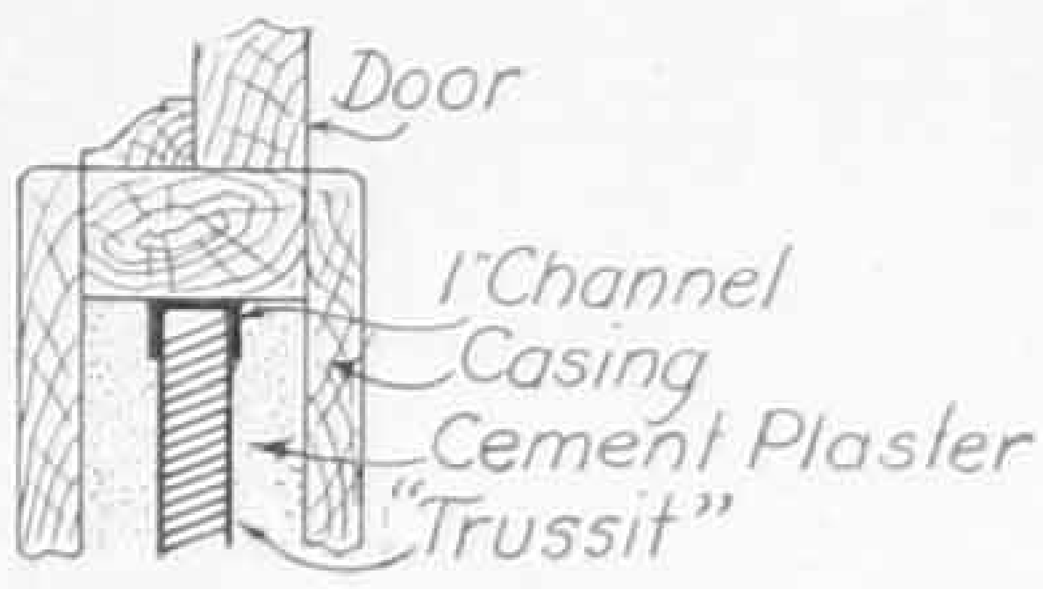
Attaching Trussit Partitions to Tile Floors

Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail

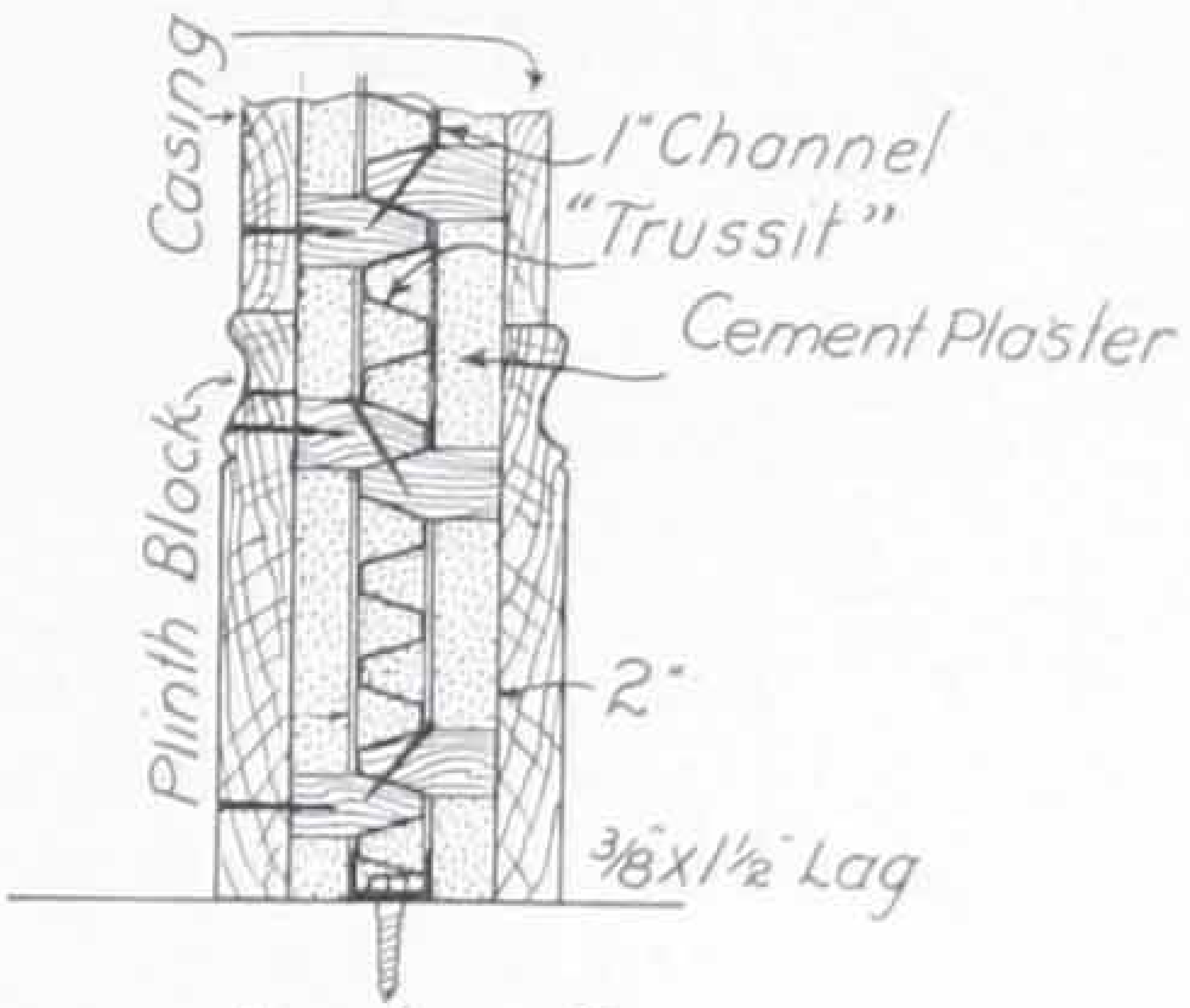




Section B

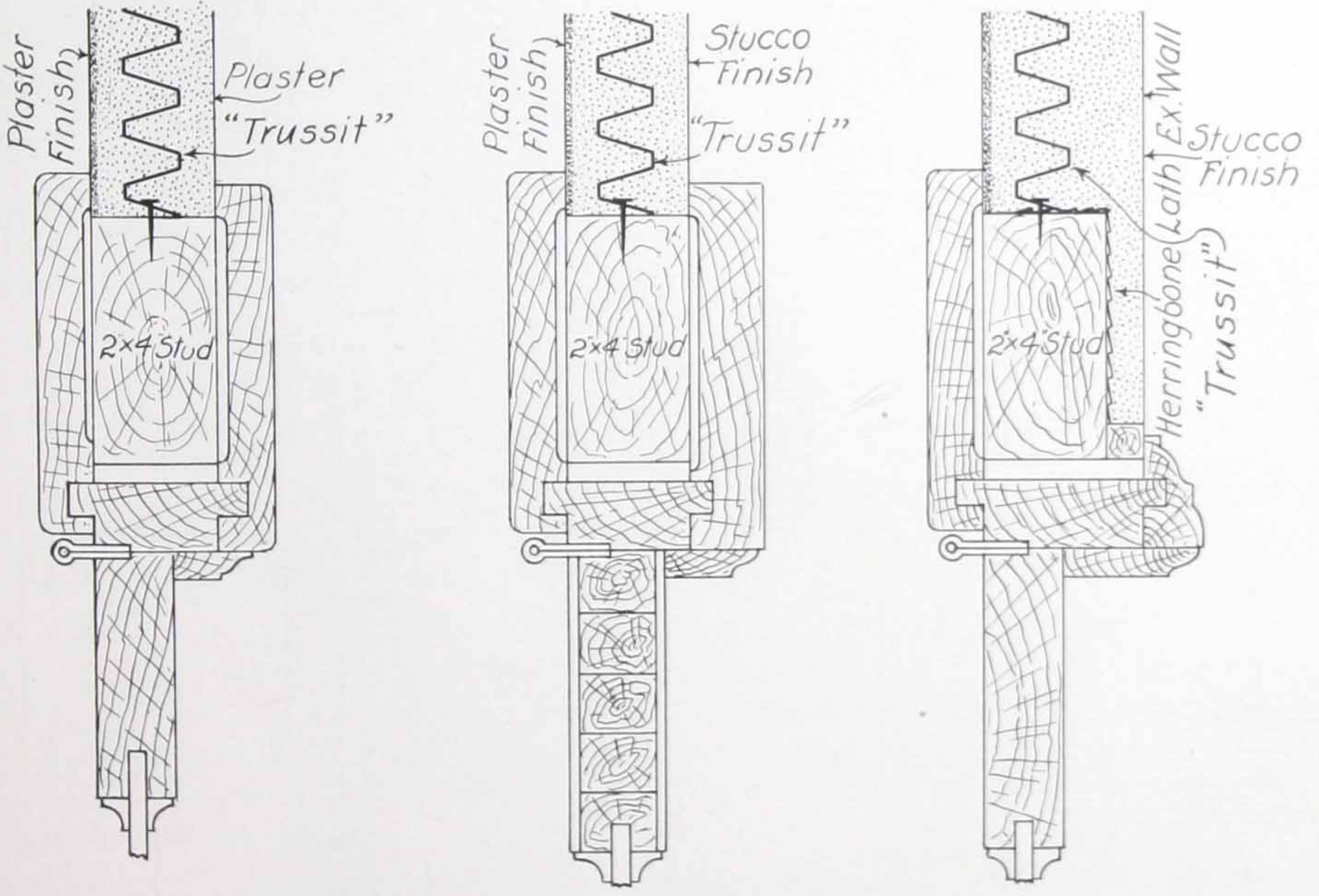


Section C



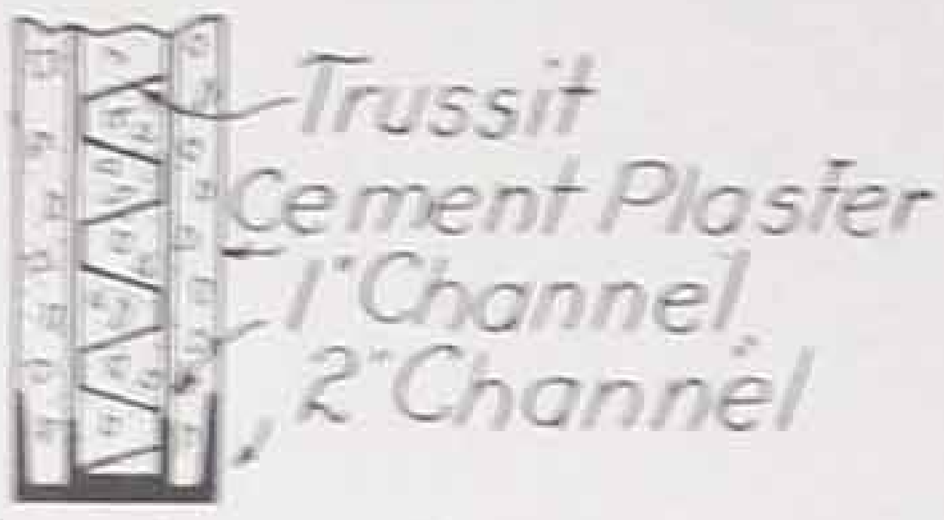
Section A

Framing of Wood Doors — Trussit Partitions

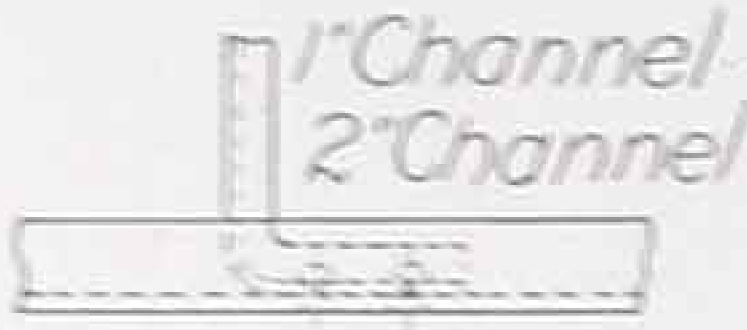


Method of Framing Wood Doors Where Angle Stiffener is Not Used

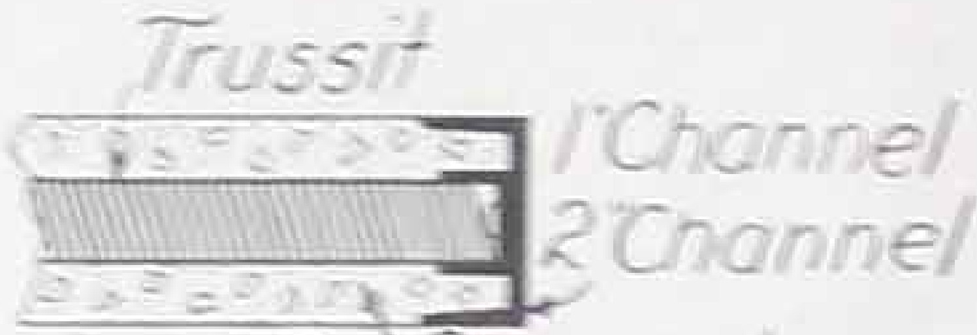
Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail



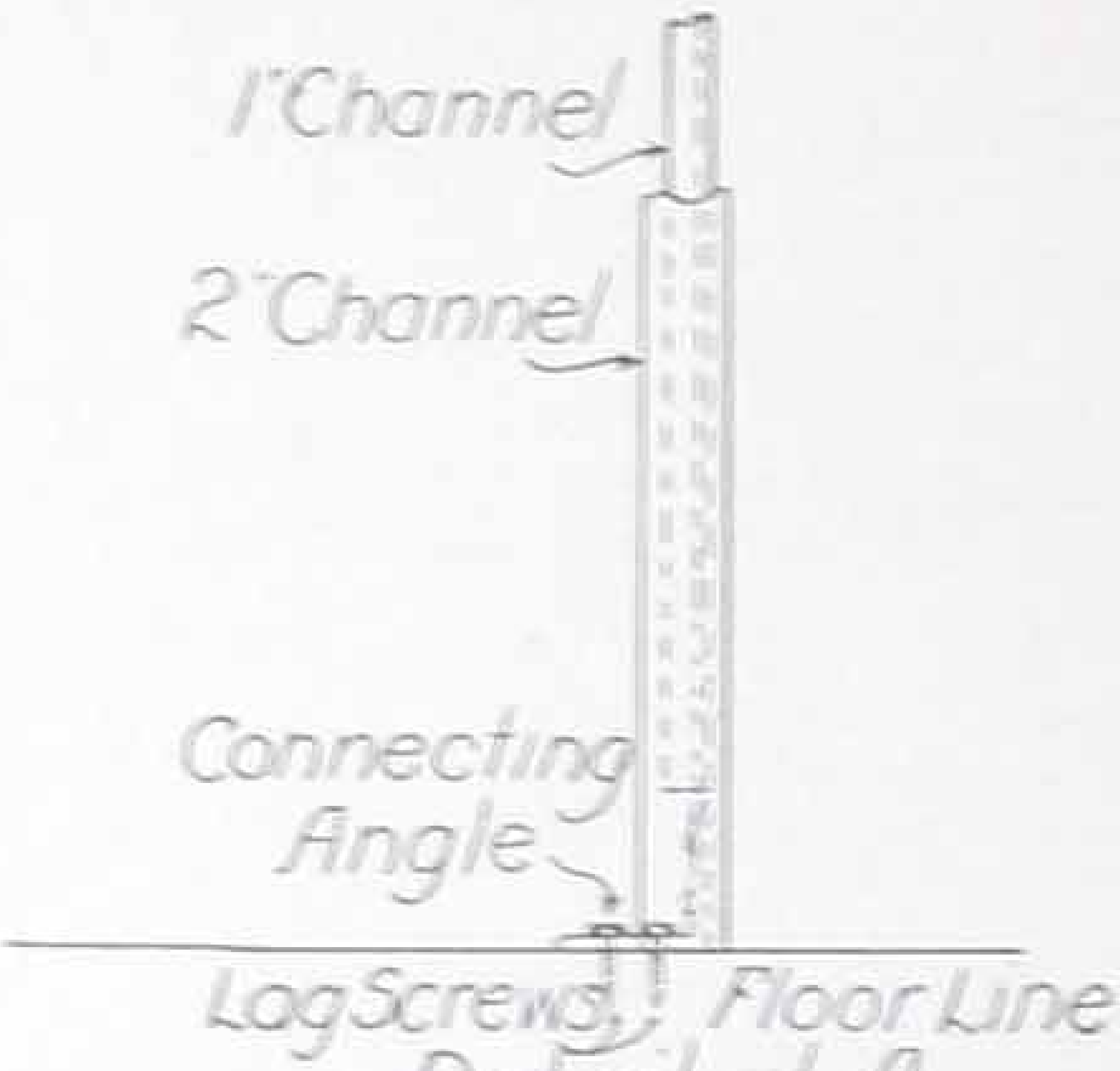
Section D.



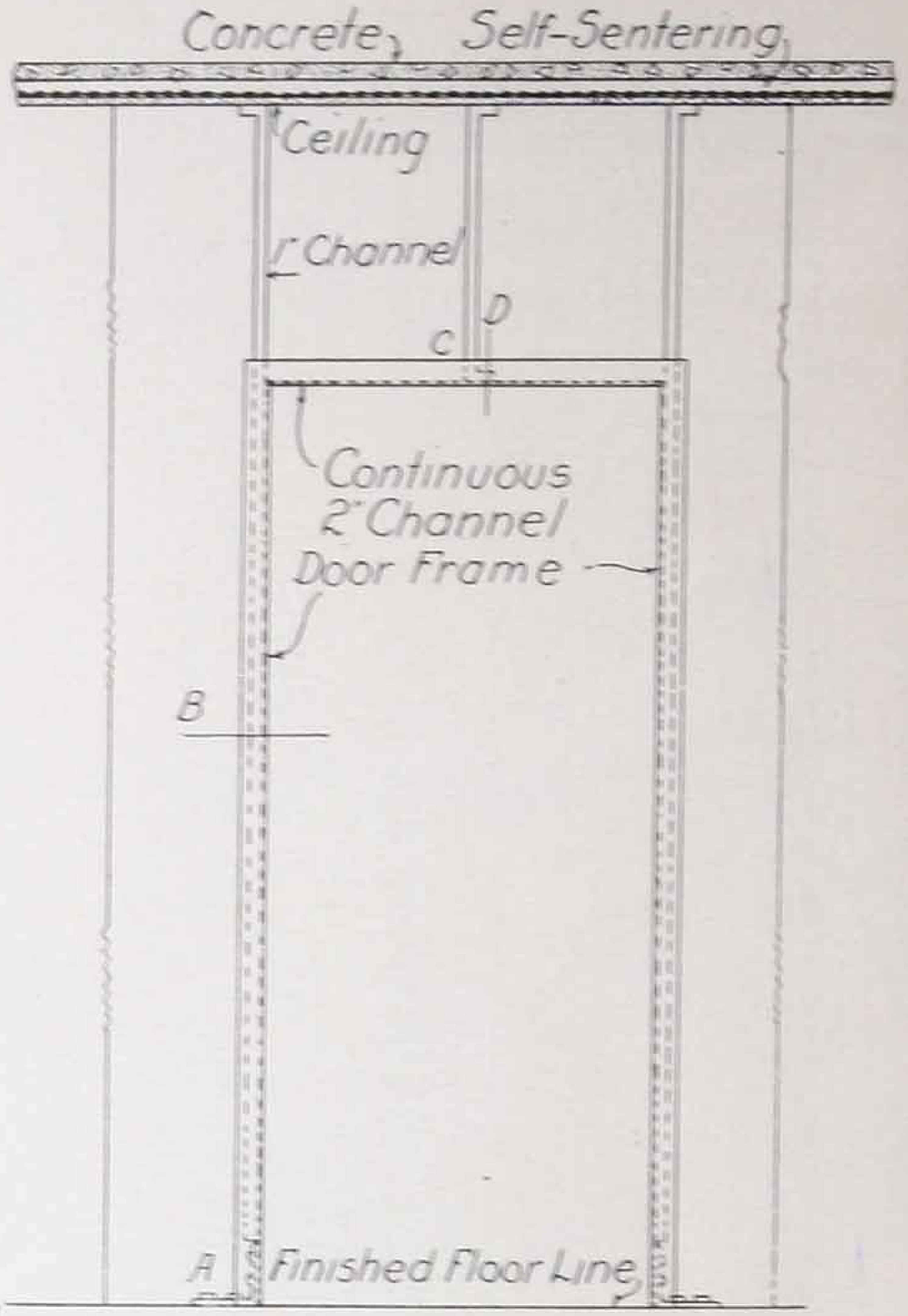
Detail at C

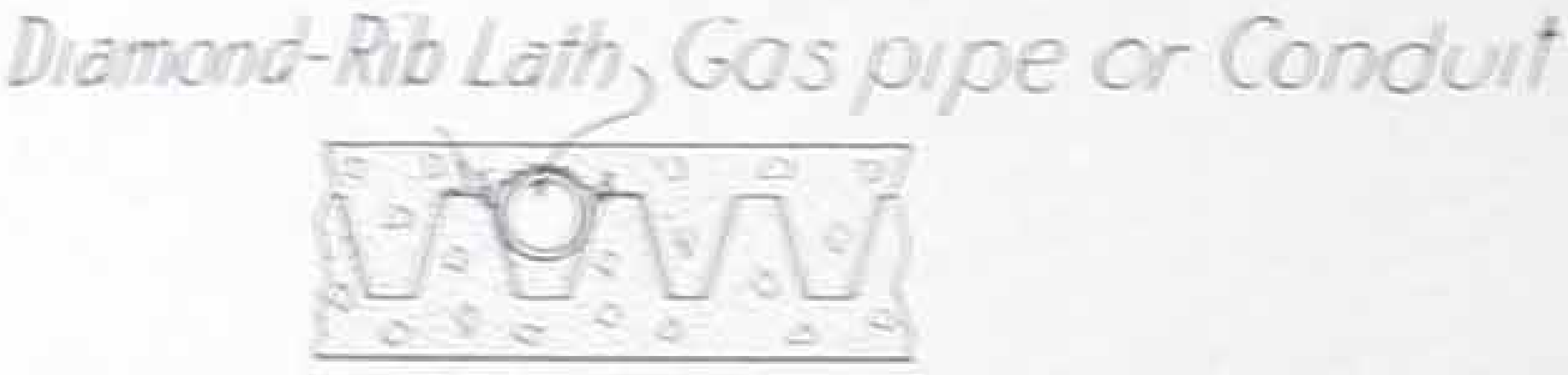


Section B

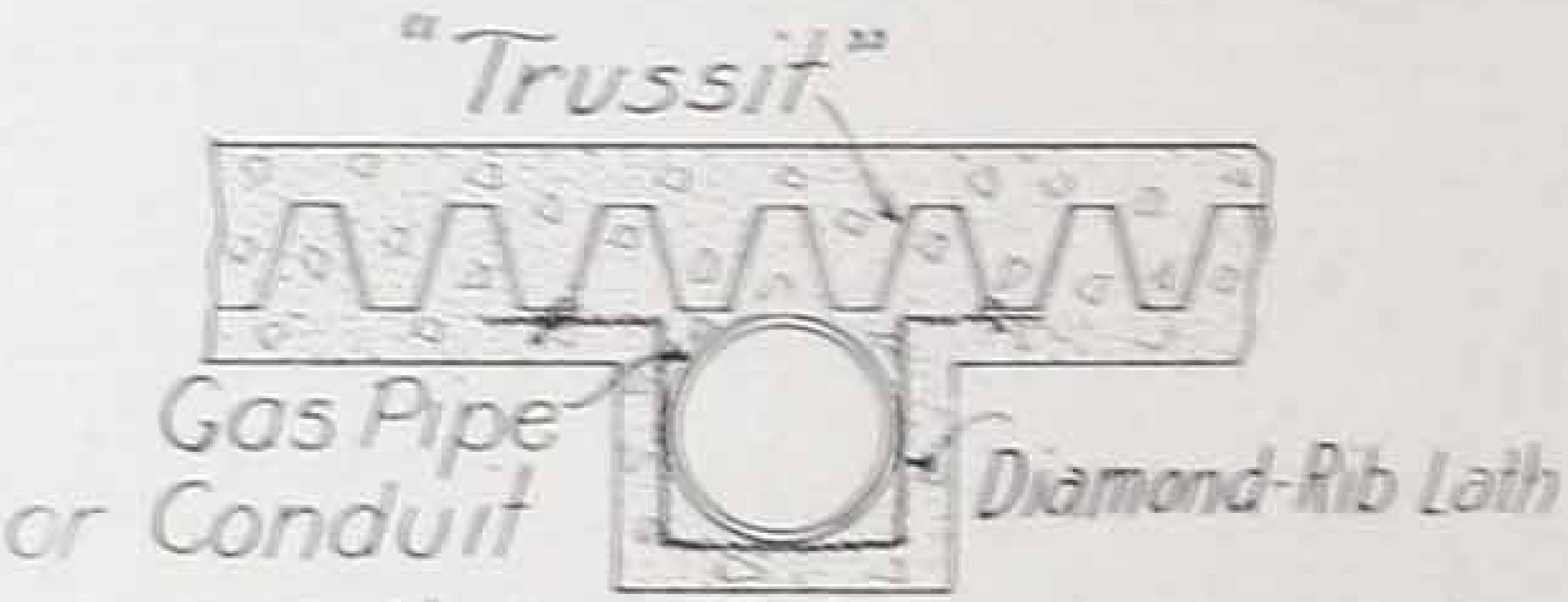


Detail at A.

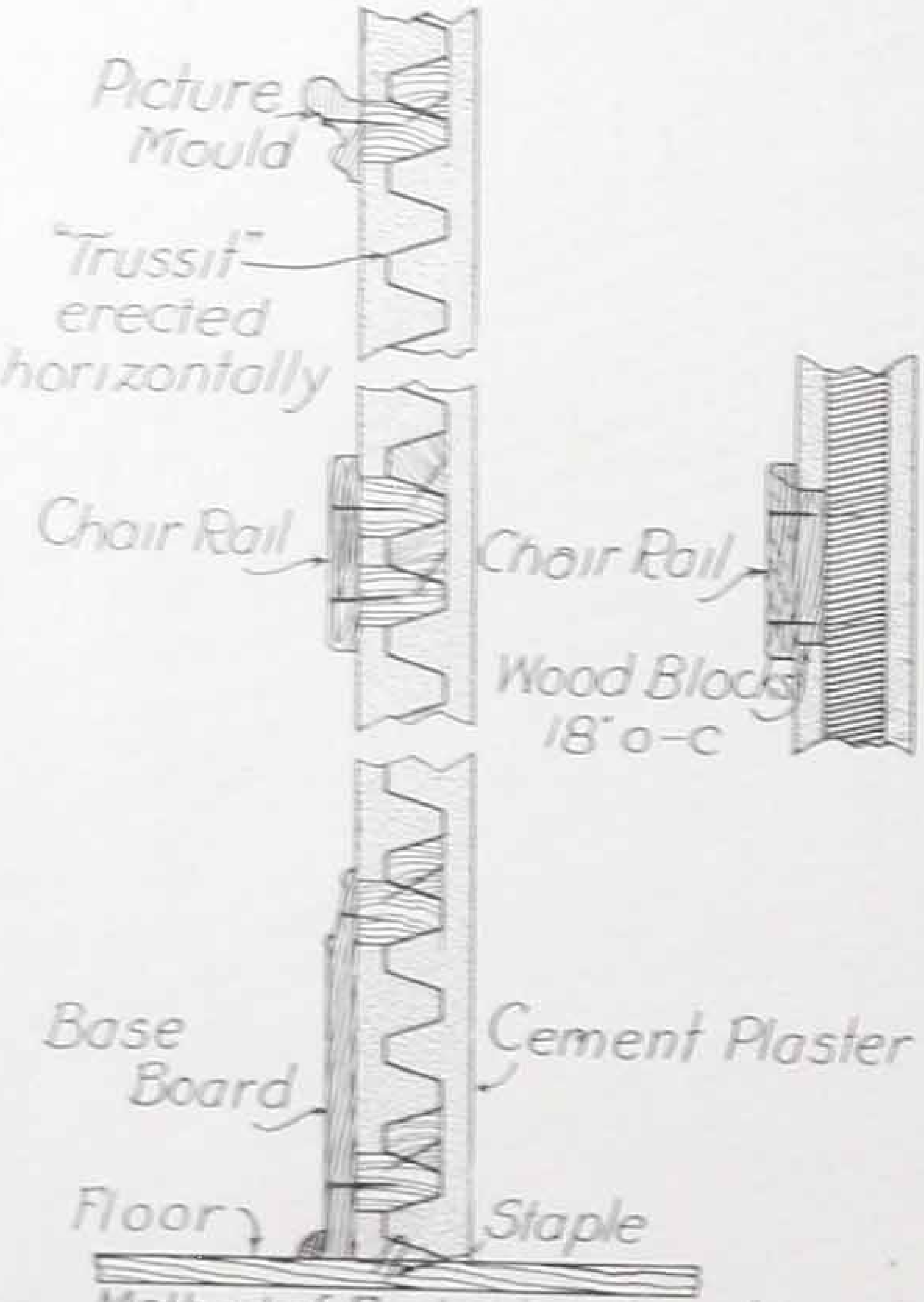




Detail showing placing of pipes or Coduits in "Trussit" Partitions

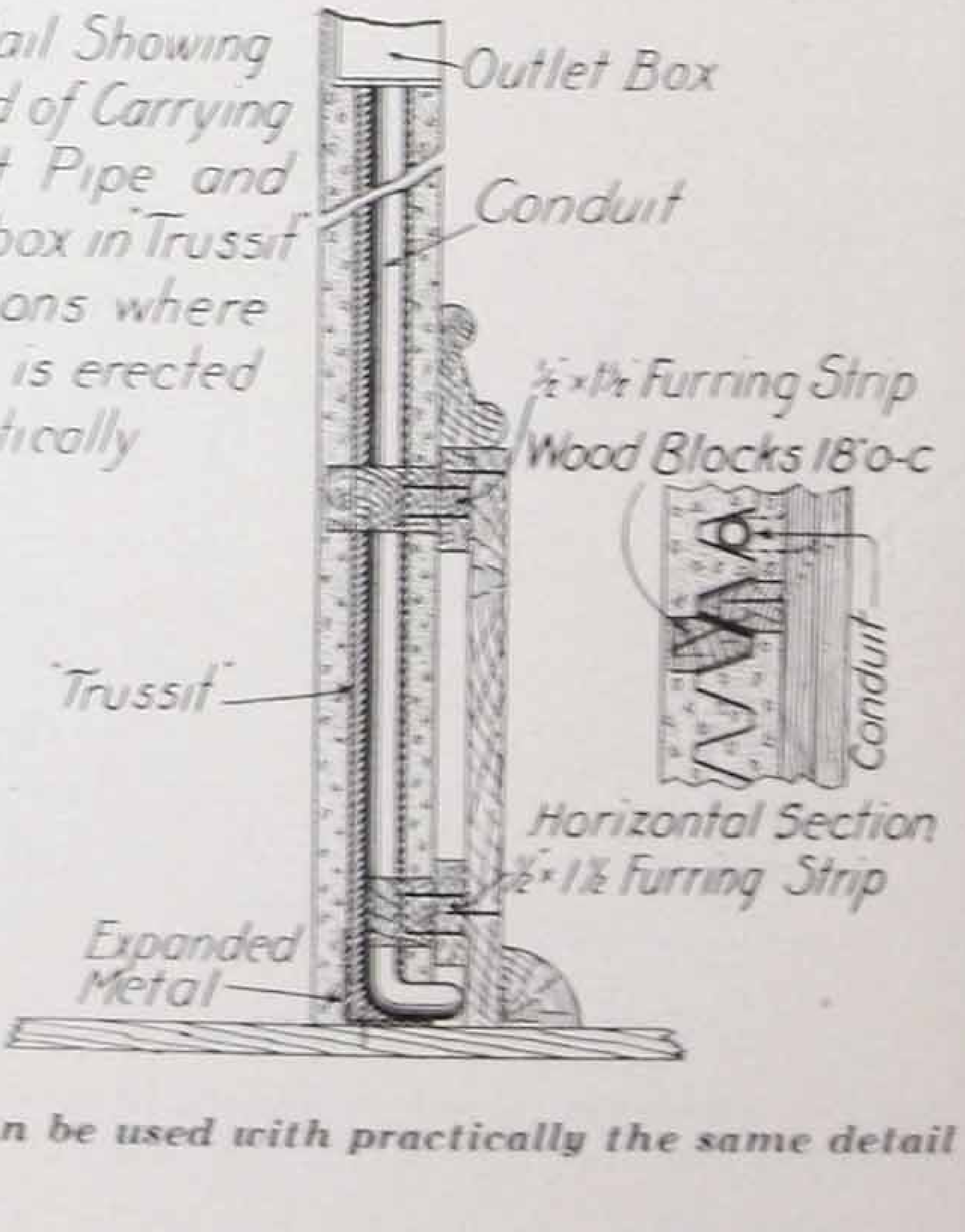


Detail showing arrangement of large pipes in 2" "Trussit" Partitions



Method of Fastening Base board. Chair rail and Picture mould to "Trussit"

Detail Showing Method of Carrying Conduit Pipe and Outlet box in "Trussit" Partitions where Trussit is erected vertically



Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail

Solid Partition Specifications

Trussit or Self-Sentering shall be used for all interior partitions, as indicated on plan.

Height	Trussit	Height	Self-Sentering
Up to 12 ft.	27 gauge	Up to 12 ft.	28 gauge
12 ft. to 15 ft.	26 gauge	12 ft. to 17 ft.	26 gauge
15 ft. to 17 ft.	24 gauge	Over 17 ft.	24 gauge

Trussit or Self-Sentering shall be erected on temporary studding with ribs running either horizontally or vertically. This is to be controlled by general conditions obtaining, the ribs always running the short way of the span.

Temporary studding shall be wedged or lightly nailed in place, spaced on 5-foot centers, with the ribs of the metal running horizontally. If they run vertically, horizontal cross pieces spaced 5 feet on centers shall be wired to the temporary vertical studs or held in place by bracing to the floor.

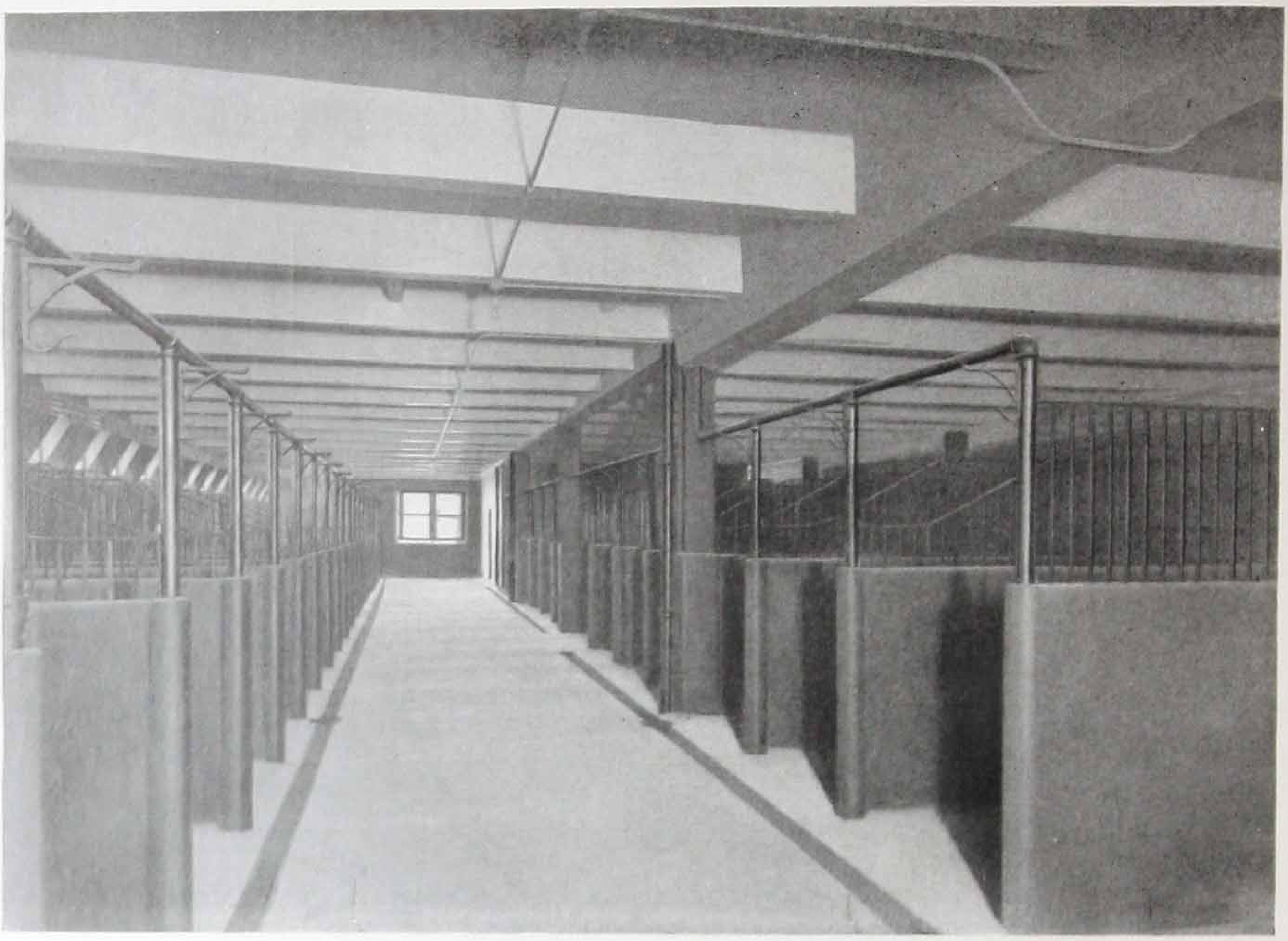
The metal shall be rigidly wired to temporary studding with the selvedges or side ribs interlocking, and an end lap of not less than 1 inch. It shall also be attached to all columns, door and window framing and other permanent supports.

All side and end laps shall interlock and shall be securely laced with No. 16 gauge tie wire at intervals of about 12 inches, and the top and bottom sheets secured to floor and ceiling by the use of expanded metal angle or other methods as shown in details herewith. On Self-Sentering, side laps may be secured by clinching with a special punch as shown on page 7. (Note—Where Self-Sentering is erected vertically, sheets may be laid out and fastened together on the floor and raised to place five or six at a time.) The partition is then ready for plaster.

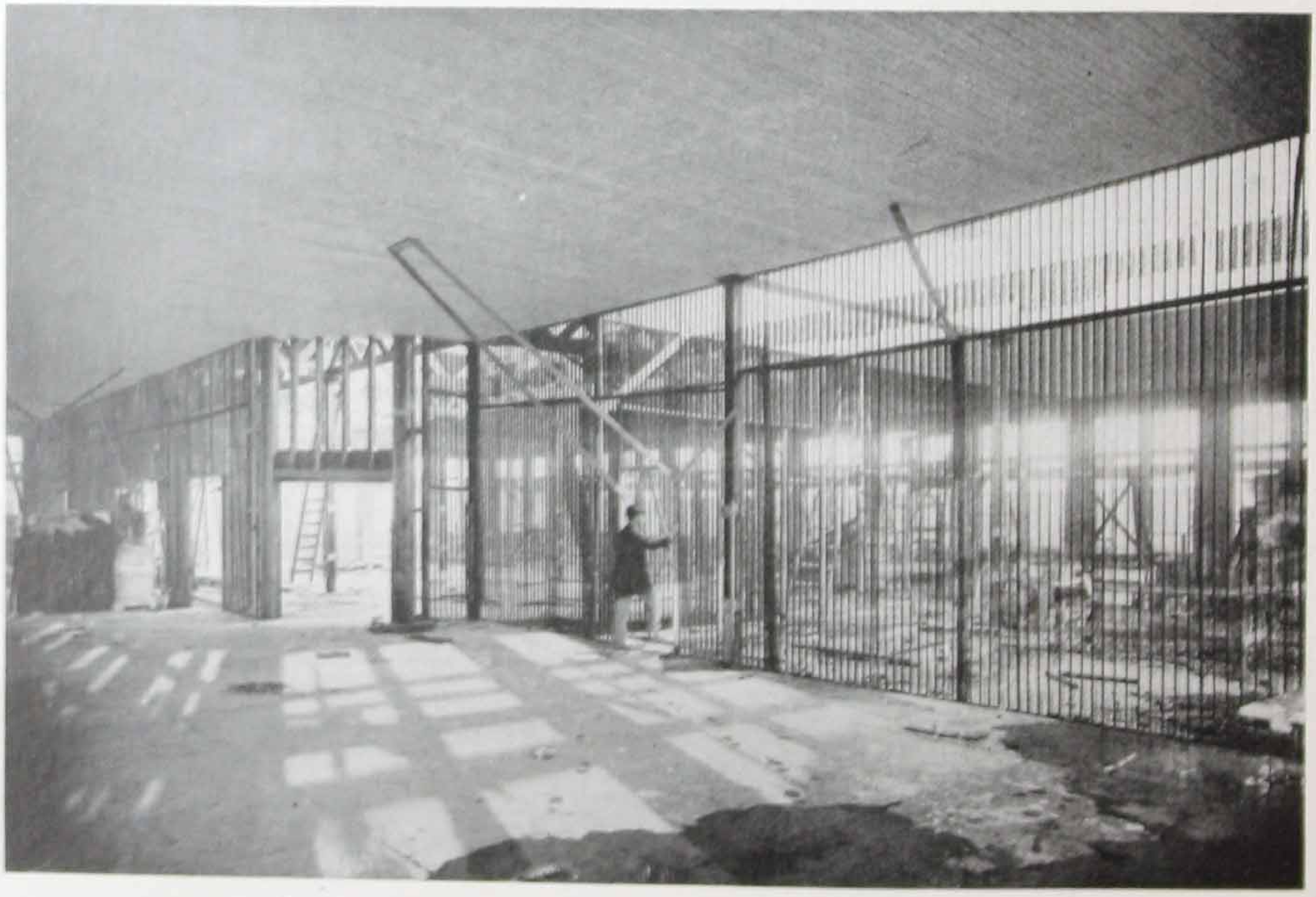
The side opposite temporary studding shall be plastered first. Ordinary patent plasters can be used under certain conditions with good results, but if a cement plaster is used, the following has been found to be the most efficient mix: One part Portland cement, three parts sand and a small amount of hair, well tempered with lime mortar to set up hard and firm. This mortar is applied to a depth of 5/8 inch over the ribs of the metal and floated to an even surface.

After the first coat has set, the temporary studding is removed and the opposite side plastered in the same manner. The total thickness of the partition is approximately 2 inches. If thicker walls are desired it is only necessary to apply additional coats of plaster until the required thickness is obtained. This thickness should not exceed 3½ inches, however.

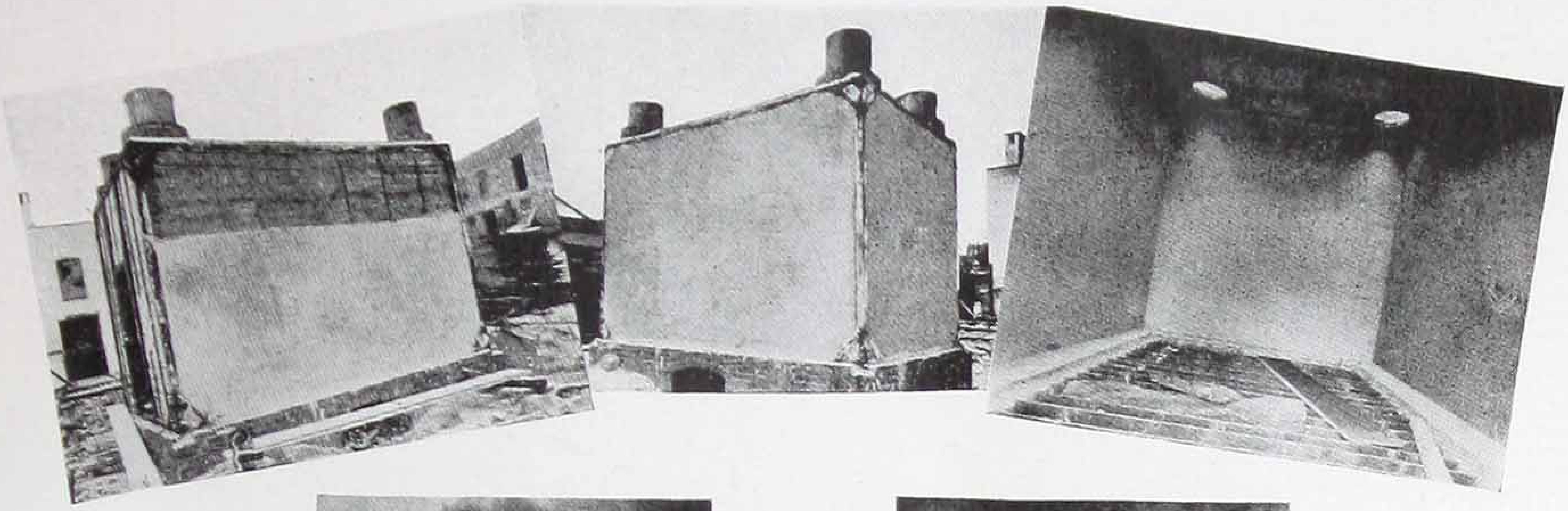
Where baseboards or picture mouldings are required, wood blocks are fitted to the metal before plastering, nailed or wired together and the moulding or baseboard nailed to these blocks as shown.

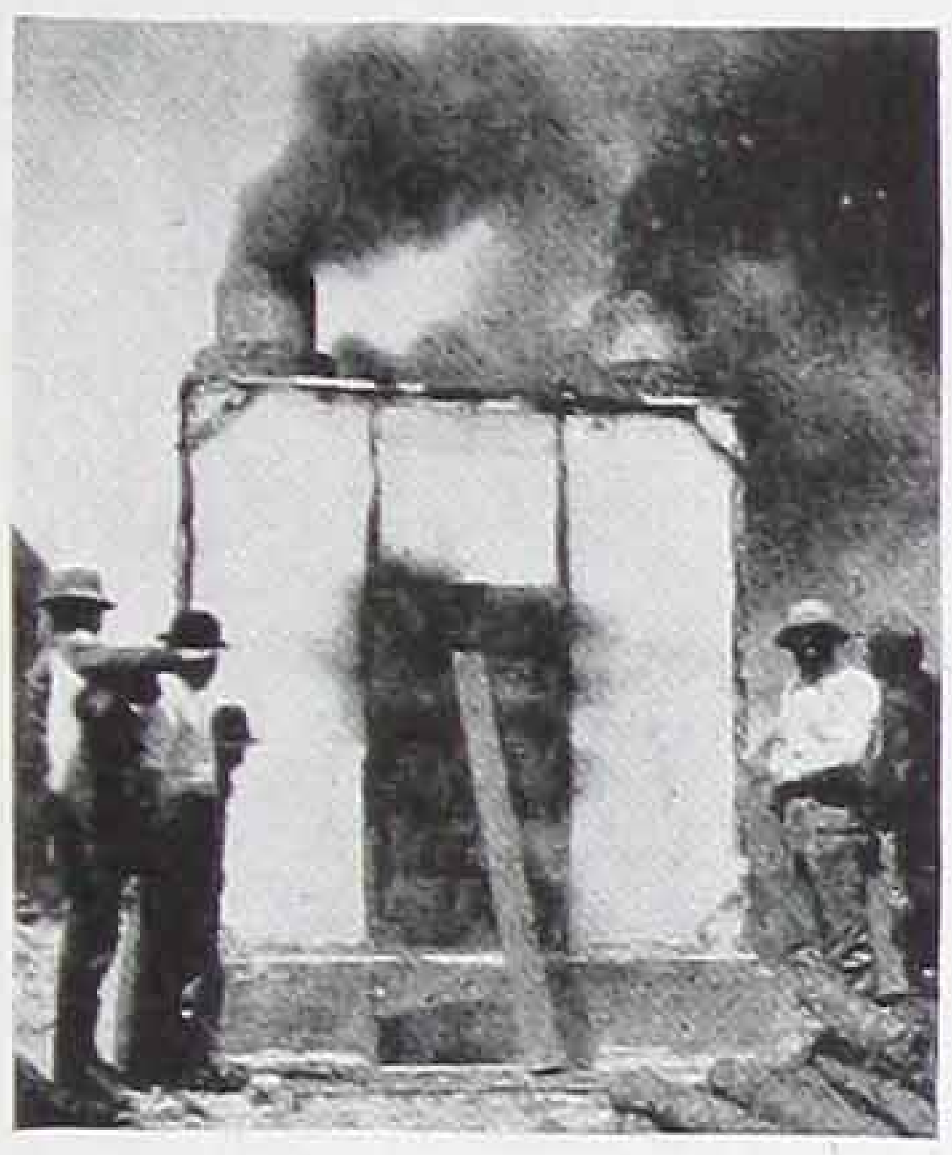


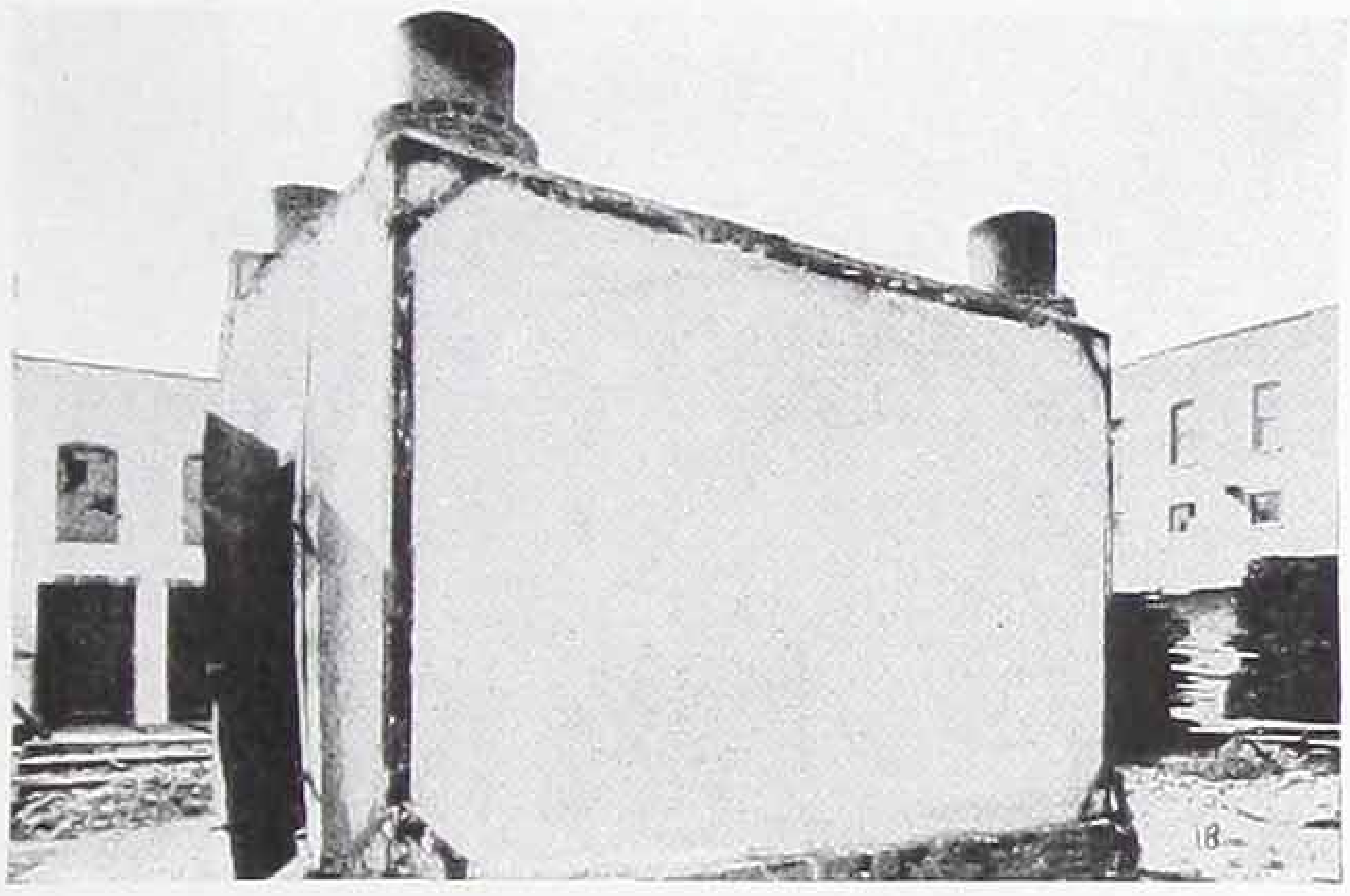
Simon Brewing Co's. Barn, Buffalo, N. Y. All Stall Partitions made of Trussit
Architect, Julius C. Schultz, Buffalo



Letterman General Hospital, San Francisco, Cal.
Self-Sentering used for 2-inch Solid Partitions





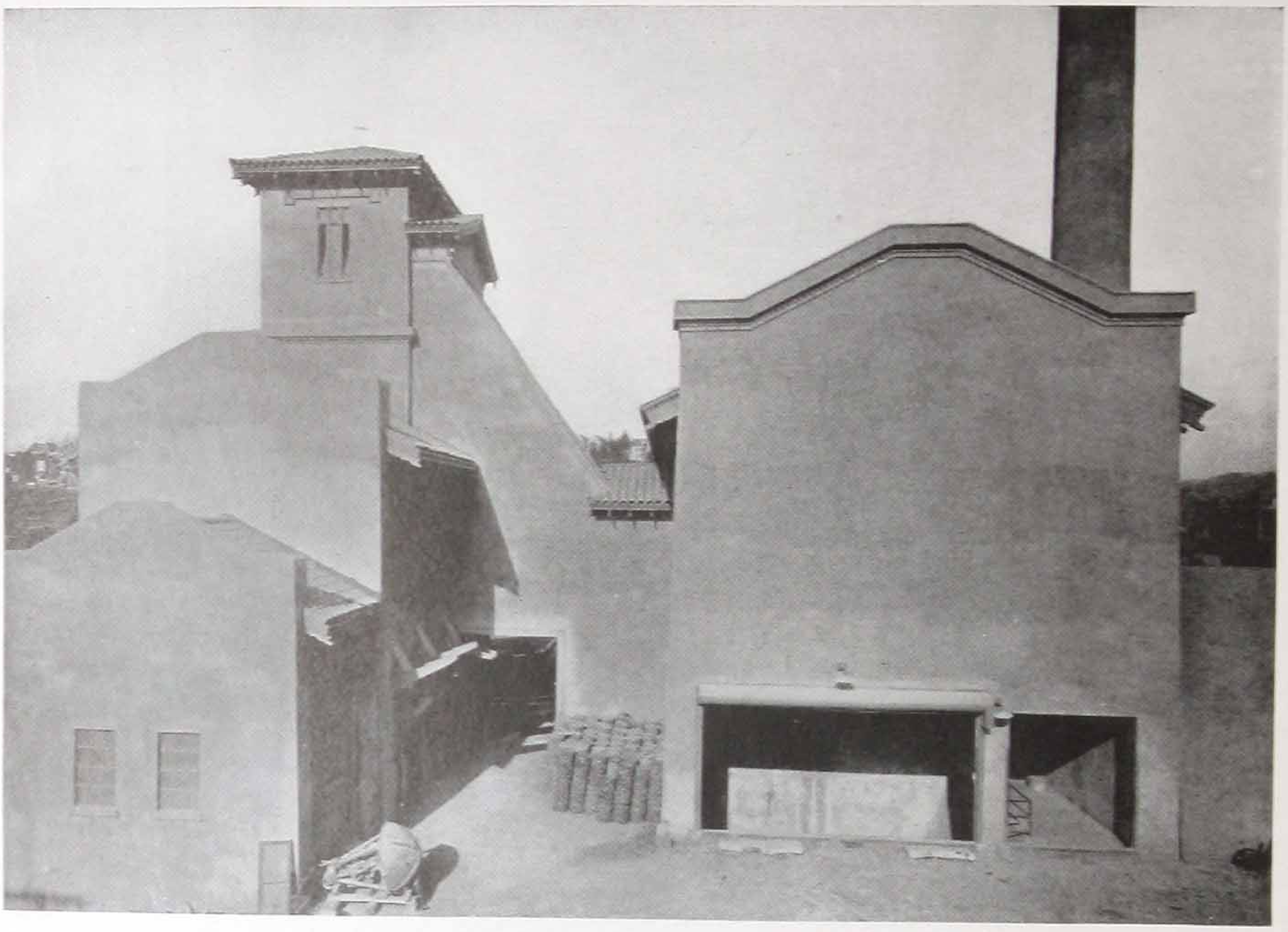


Fire Test on Trussit Partitions New York City

The Trussit partitions for this test were erected on 1¼-inch tees, 4 feet on centers. The partitions were covered on both sides with cement plaster to a total thickness of 2½ inches. They were 9 feet, 6 inches high and 14 feet, 6 inches long.

The partition was subjected to an average of 1700 degrees of heat for one hour. At the end of this time a stream of water from a 1⅛-inch nozzle with hydrant pressure was directed against the partition for 2½ minutes. No fire or water passed through the partition at any point. As a result of the test, Trussit was approved in New York City for all interior fireproof partitions, elevator enclosures, dumb waiter and light shafts and bulkheads.

Trussit or Self-Sentering Curtain Walls



Municipal Incinerator, San Francisco, Cal.
Self-Sentering curtain walls and roof on tower and inclined runway. No perceptible difference between this and the heavy, reinforced concrete construction on either side

Trussit or Self-Sentering as a reinforcement for outside curtain walls of cement gives fireproof construction at a cost much less than that of brick, tile or poured concrete. The slabs are reduced to a minimum thickness, yet they are amply strong and rigid, due to the perfect distribution of the reinforcing metal. Unlike the other walls mentioned, they present a perfect finished appearance from the beginning and never require repairs. They cost somewhat more than the antiquated corrugated iron siding, but the rusting and needed continual painting of the corrugated iron in a short time brings the cost far above that of the Trussit or Self-Sentering wall.

Such walls are simply and quickly erected, no studding or form work being necessary. The sheets are merely set in place, securely fastened at top and bottom and at all laps and to such structural members as are necessary to support floor and roof. Cement plaster is then applied inside and out and the walls are complete. Such construction is particularly adapted to all classes of industrial buildings.

Trussit or Self-Sentering Curtain Wall Specifications

Trussit or Self-Sentering, as manufactured by The General Fireproofing Company, of Youngstown, Ohio, shall be used as a reinforcement for all exterior curtain walls. Gauges to be used as indicated in the following table:

Spacing of Supports	Wall Thickness	Trussit Gauge	Self Sentering Gauge
6′	1¾″	27	28
8′	2″	26	28
10′	2½″	26	26
12′	2½″	24	26

Where supports are more than 6 feet apart, temporary bracing shall be provided on 6-foot centers to give a firm plastering surface until one side has been plastered.

Sheets to be securely fastened to columns and other permanent supports at intervals not to exceed 7¼ inches, the corrugations or ribs running in the direction of the shortest spans.

Where structural supports are used, Trussit or Self-Sentering shall be attached by special clips (which can be secured from manufacturers) or by wiring. If of wood, staples shall be used; if of reinforced concrete, any method shown in the details herewith can be used.

Side selvedge edges or side ribs of all sheets shall be securely interlocked and wired together with No. 16 gauge tie wire at intervals not to exceed one foot. On Self-Sentering, side laps may be secured by clinching with a special punch as shown on page 7. The ends of sheets should lap 6 inches if laps occur between supports and not less than 1 inch if over supports. Laps between supports must be properly staggered.

Plastering

A scratch coat shall be applied on the outside first and shall consist of one part Portland cement to three parts of clean, sharp sand, with a small amount of hair and only lime enough to insure a smooth working mortar (preferably about one-tenth by volume). This coat shall be ⅜ inch over the ribs and well worked into the mesh to properly bind on the inner side. When partly set, this coat shall be well scratched to receive the finish coat.

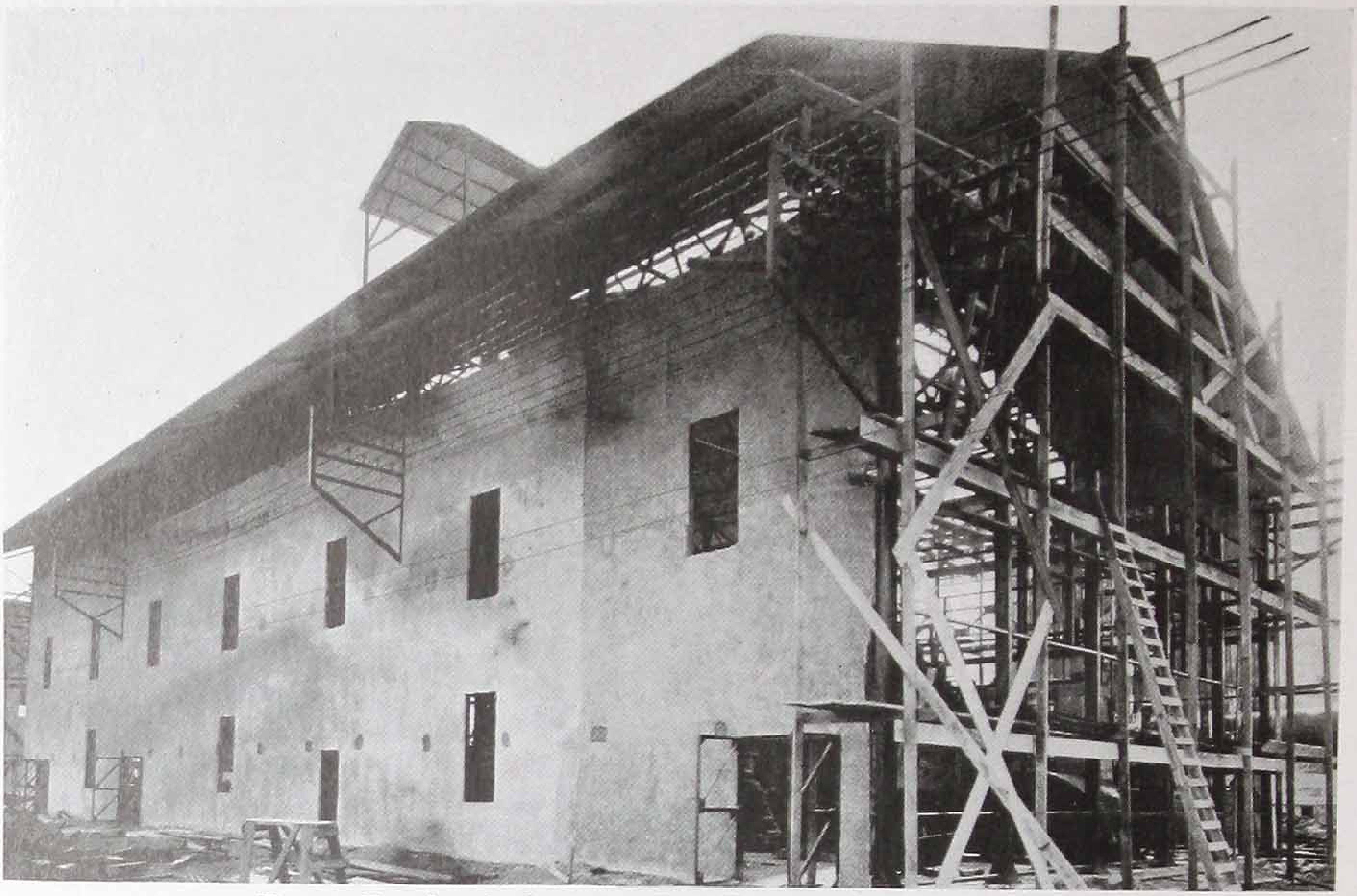
When the first coat has set, any temporary bracing shall be removed and the inside coat applied of the same mix as for the exterior and shall cover the ribs about ¼ inch.

The finished outside coat shall then be applied of one part Portland cement to two and one-half parts clean, sharp sand, with GF No. 10 Integral Waterproofing added in the amount of 2% of the cement.

If a thicker wall is required, another inside coat may be added, using either the same mix as for the first two coats or varying it by using coloring matter, white cement, or white sand to give a more pleasing appearance.

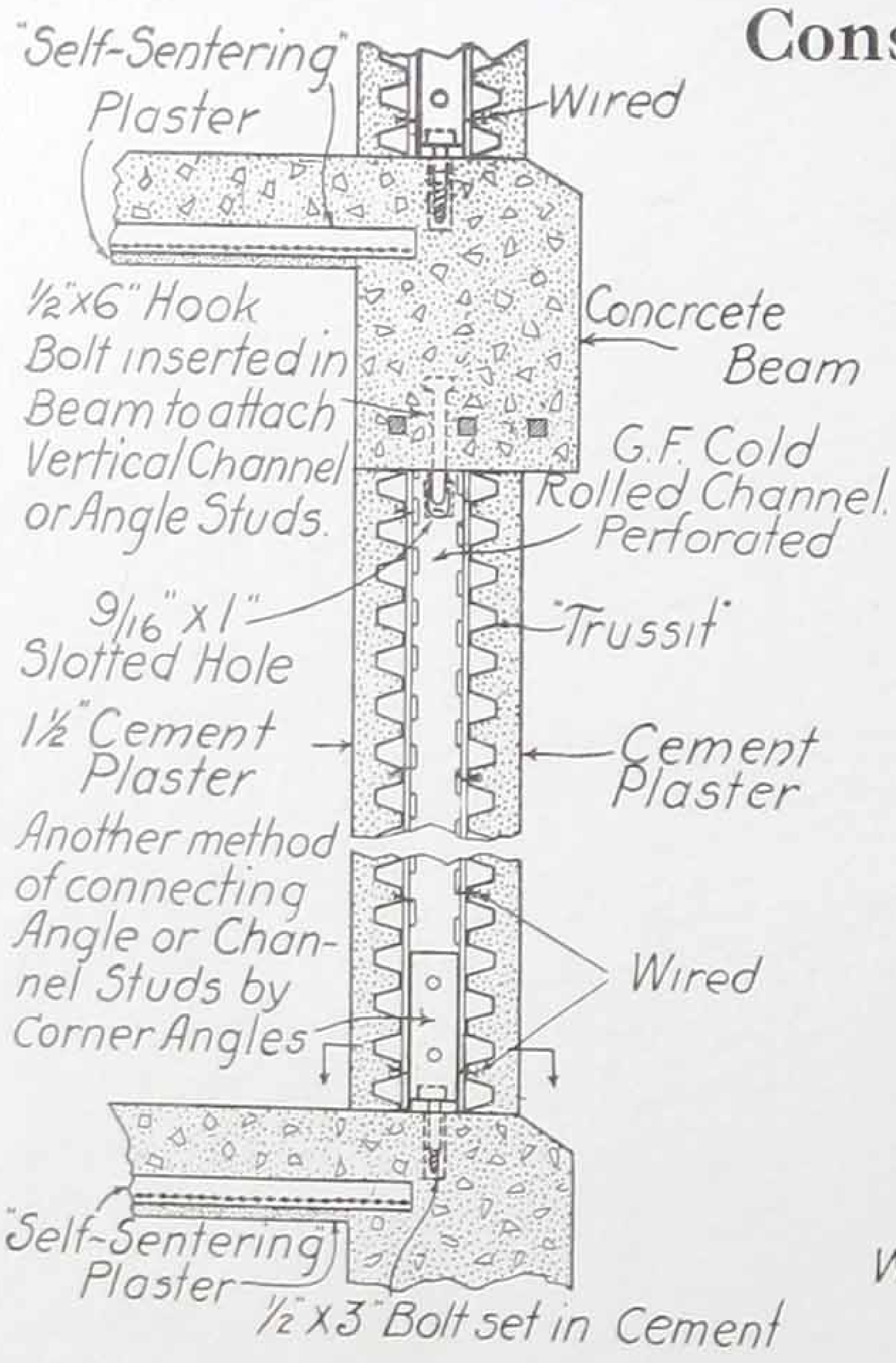
The outside coat may also be varied in the same manner, if desired.

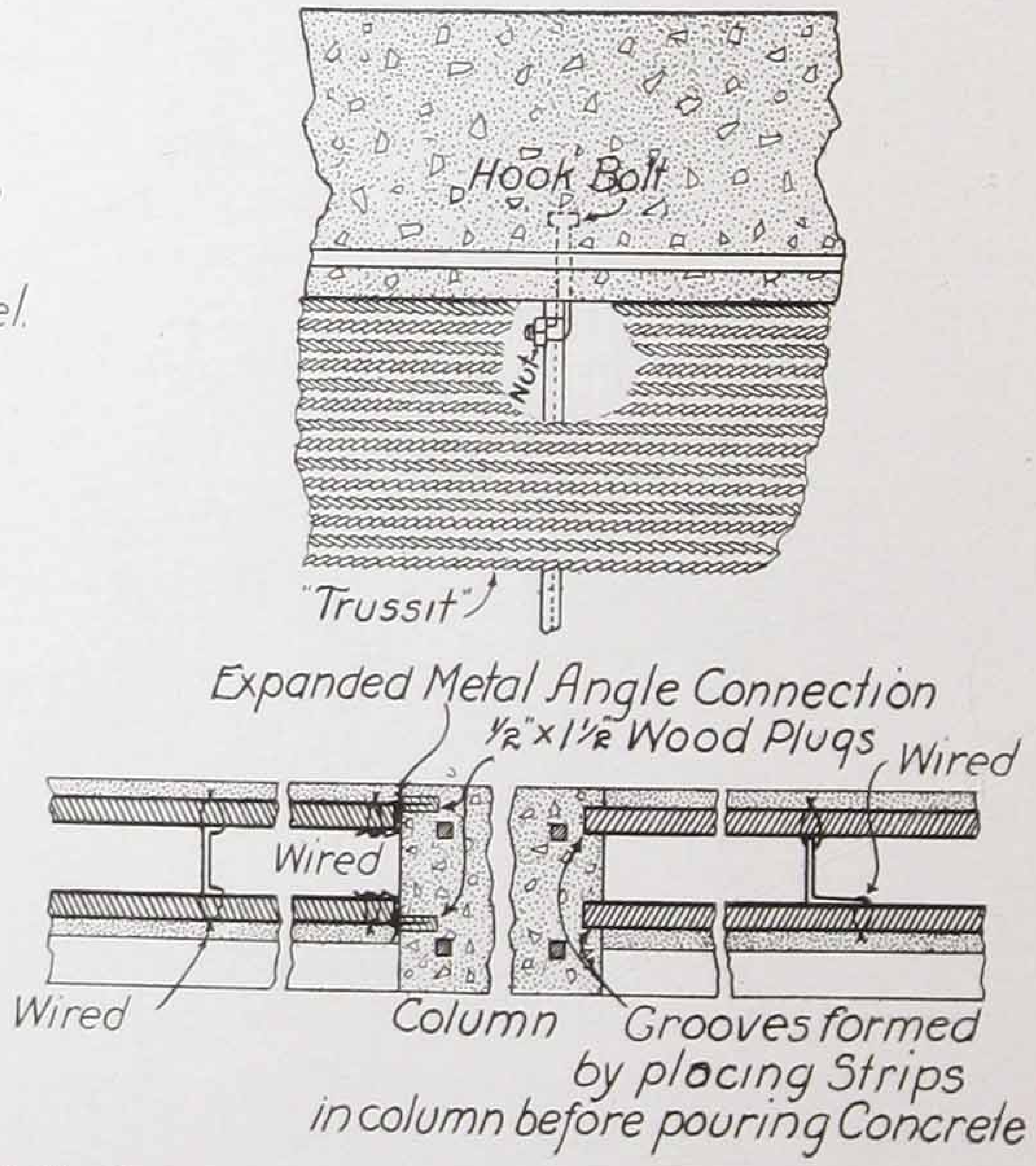
The finished work shall be protected from too rapid setting by wind or sun for several days, either by spraying or by hanging wet burlap curtains in front of the wall.



Texas Portland Cement Co. Plant, Houston, Texas
48,000 Sq. Ft. of Trussit for Walls

Detail of Trussit or Self-Sentering Wall Construction

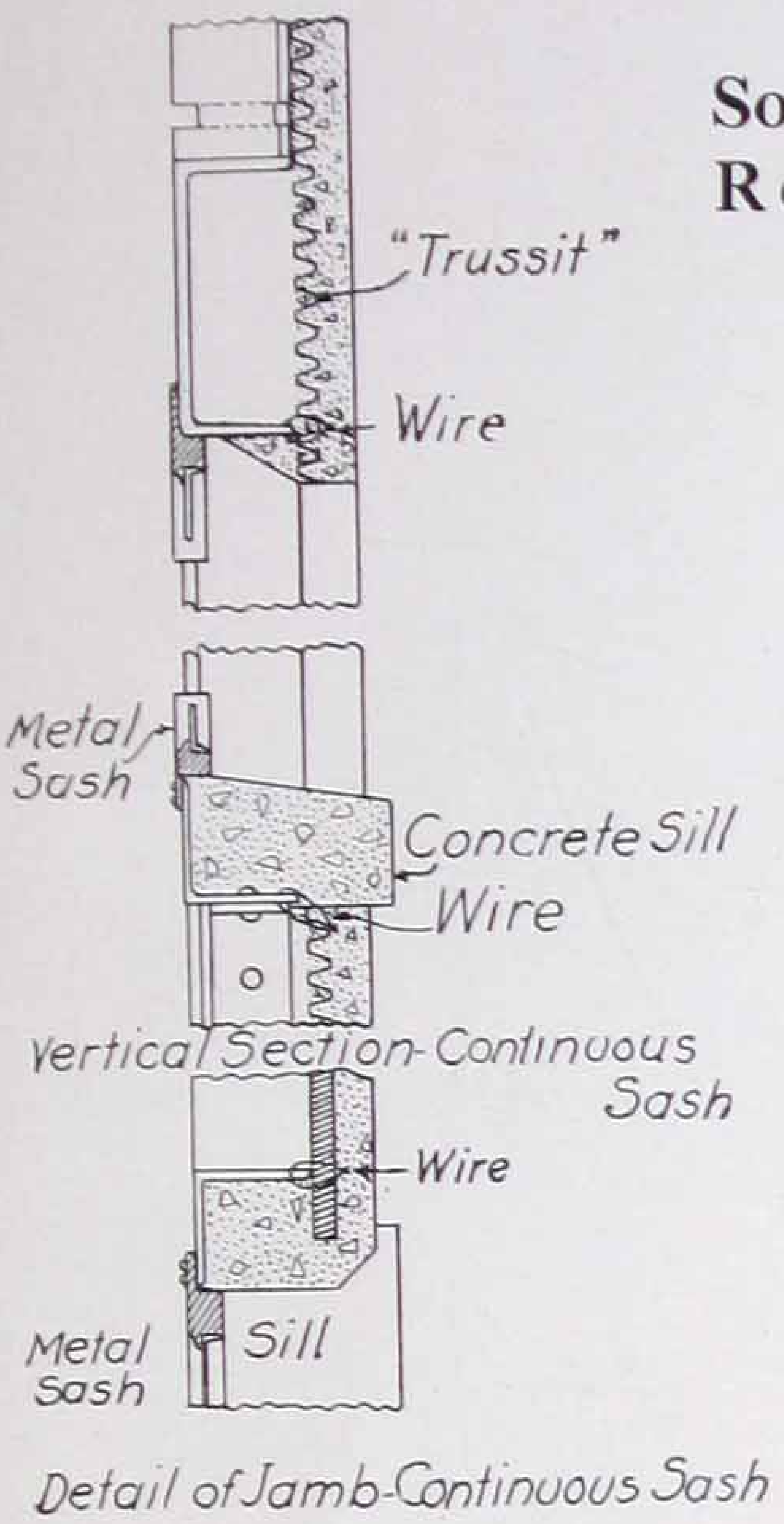

"Self-Sentering" Plaster
Wired
1/2"x6" Hook Bolt inserted in Beam to attach Vertical Channel or Angle Studs.
Concrcete Beam
G.F. Cold Rolled Channel. Perforated
9/16" x 1" Slotted Hole
"Trussit"
1 1/2" Cement Plaster
Cement Plaster
Another method of connecting Angle or Channel Studs by Corner Angles
Wired
"Self-Sentering" Plaster
1/2" x 3" Bolt set in Cement

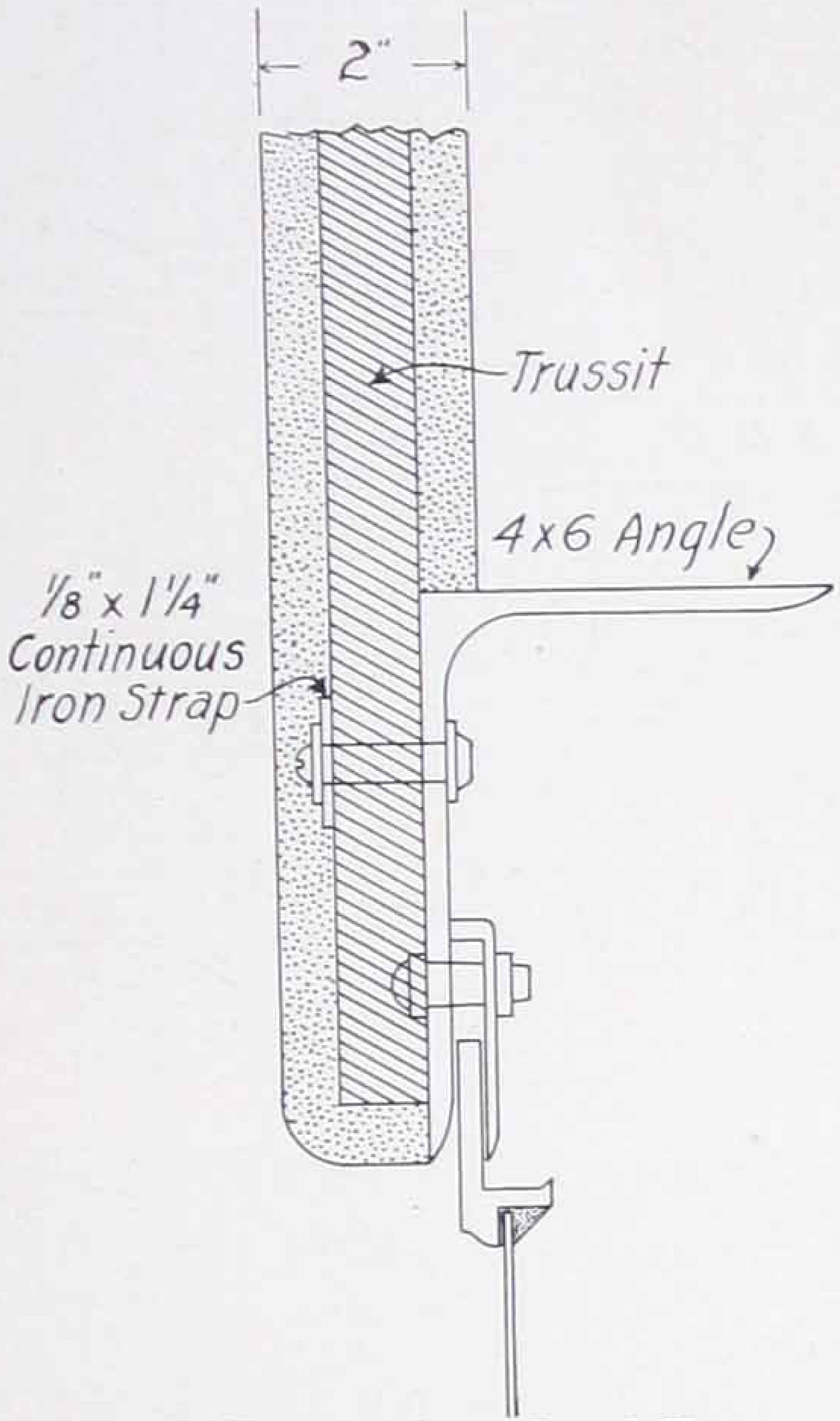

Hook Bolt
Nut
"Trussit"
Expanded Metal Angle Connection
1/2" x 1 1/2" Wood Plugs
Wired
Wired
Wired
Column
Grooves formed by placing Strips in column before pouring Concrete

Hollow Exterior Walls Reinforced with Trussit

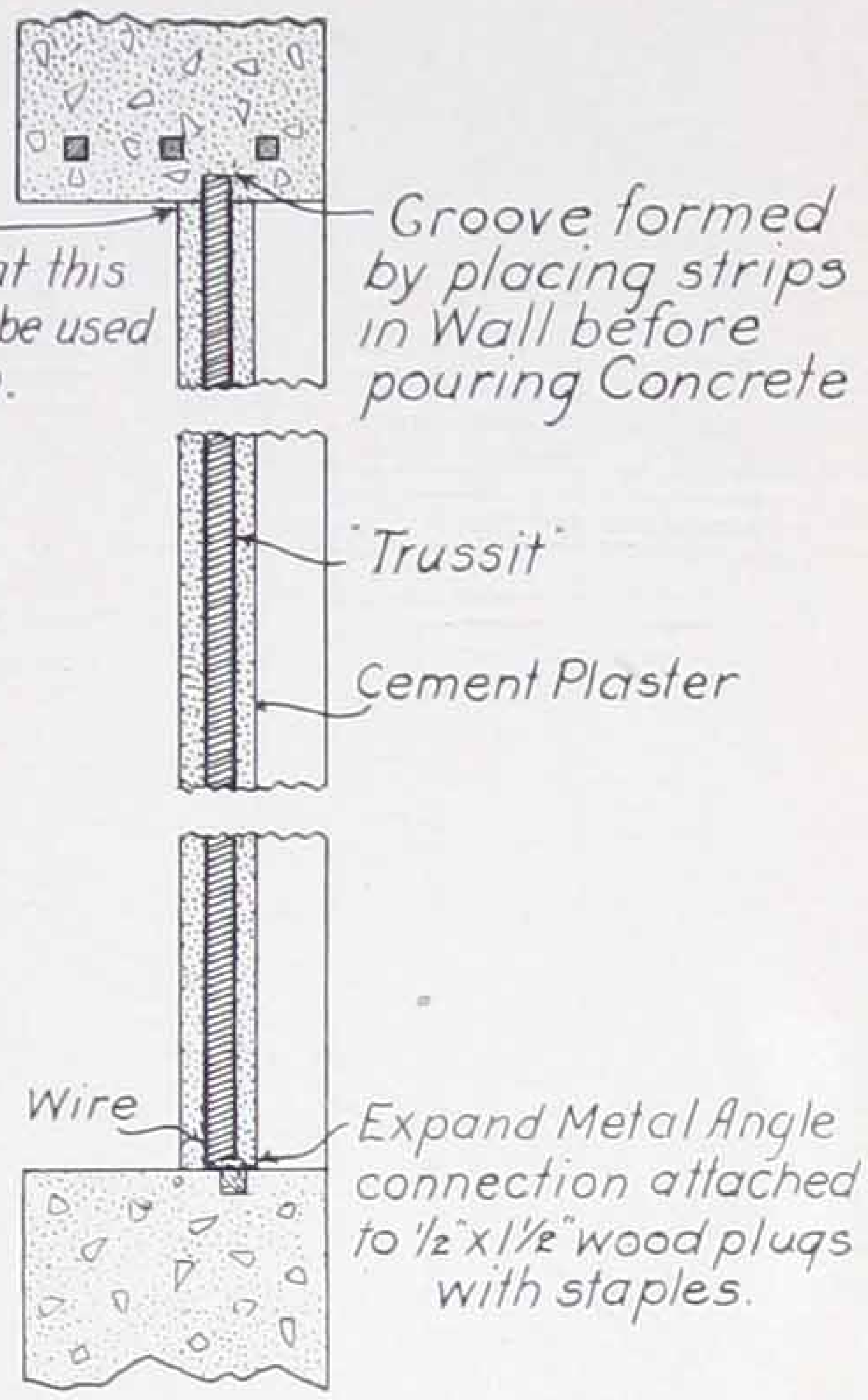
Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail

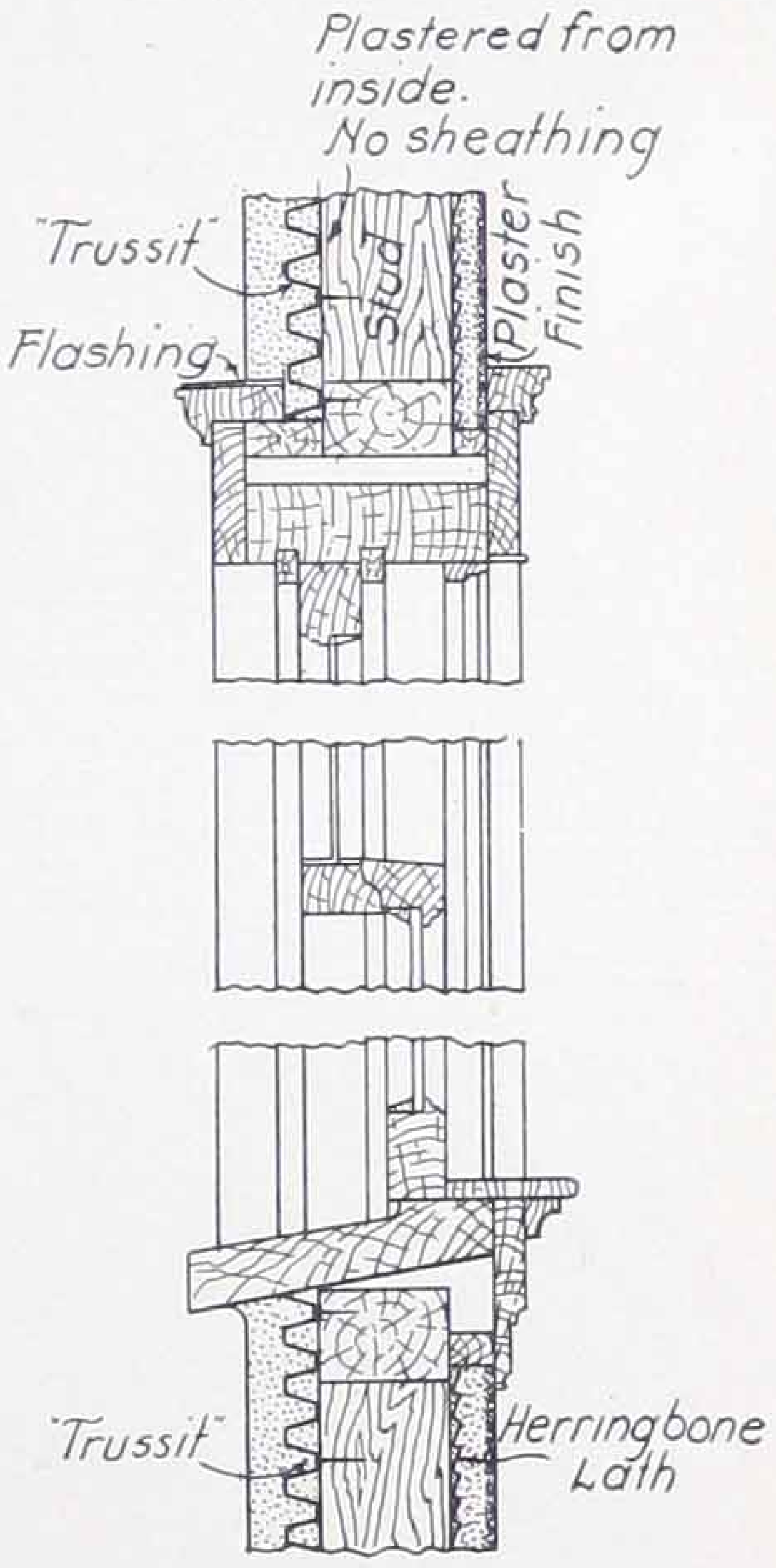
Solid Exterior Walls Reinforced with Trussit


"Trussit"
Wire
Metal Sash
Concrete Sill
Wire
Vertical Section-Continuous Sash
Wire
Metal Sash
Sill
Detail of Jamb-Continuous Sash



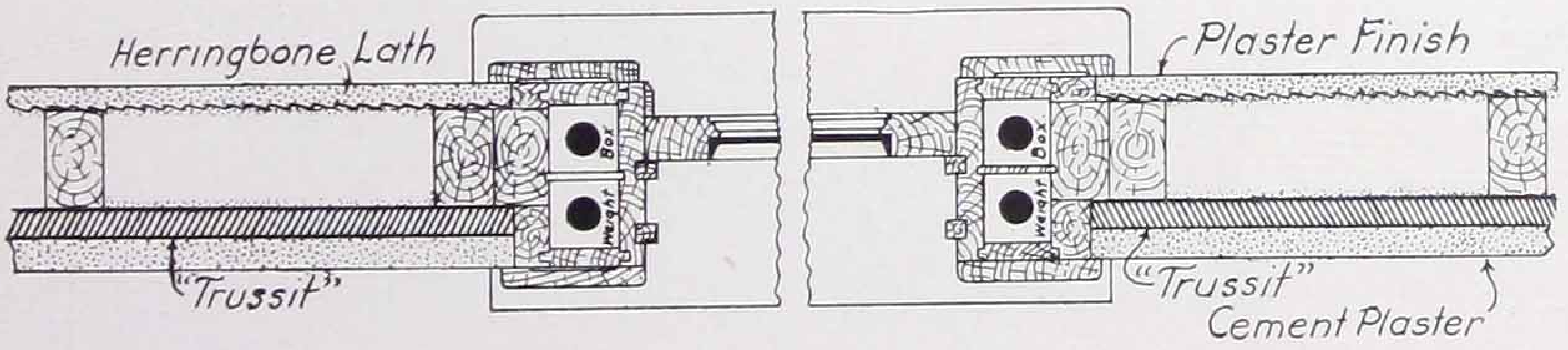
Trussit Fastened to Steel Frame Showing also Steel Sash Connection


Note that this detail can be used at bottom.
Groove formed by placing strips in Wall before pouring Concrete
"Trussit"
Cement Plaster
Wire
Expand Metal Angle connection attached to 1/2"x1 1/2" wood plugs with staples.

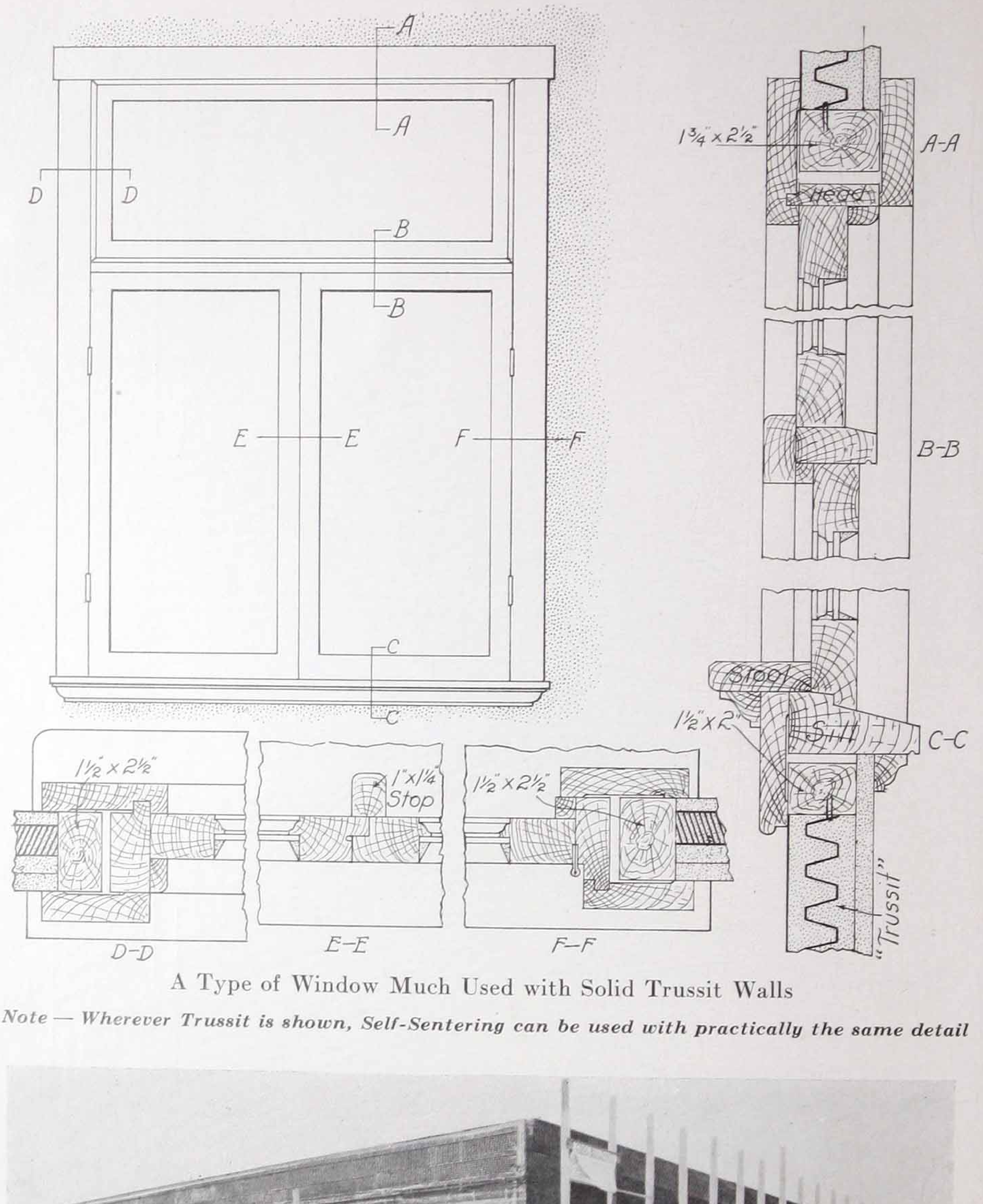


Hollow Trussit Walls on Wood Framing

Particularly suited for high grade residence construction, giving, with its 2-inch cement slab, the most durable type of stucco work. Also used for curtain walls and solid partitions in every class of building.

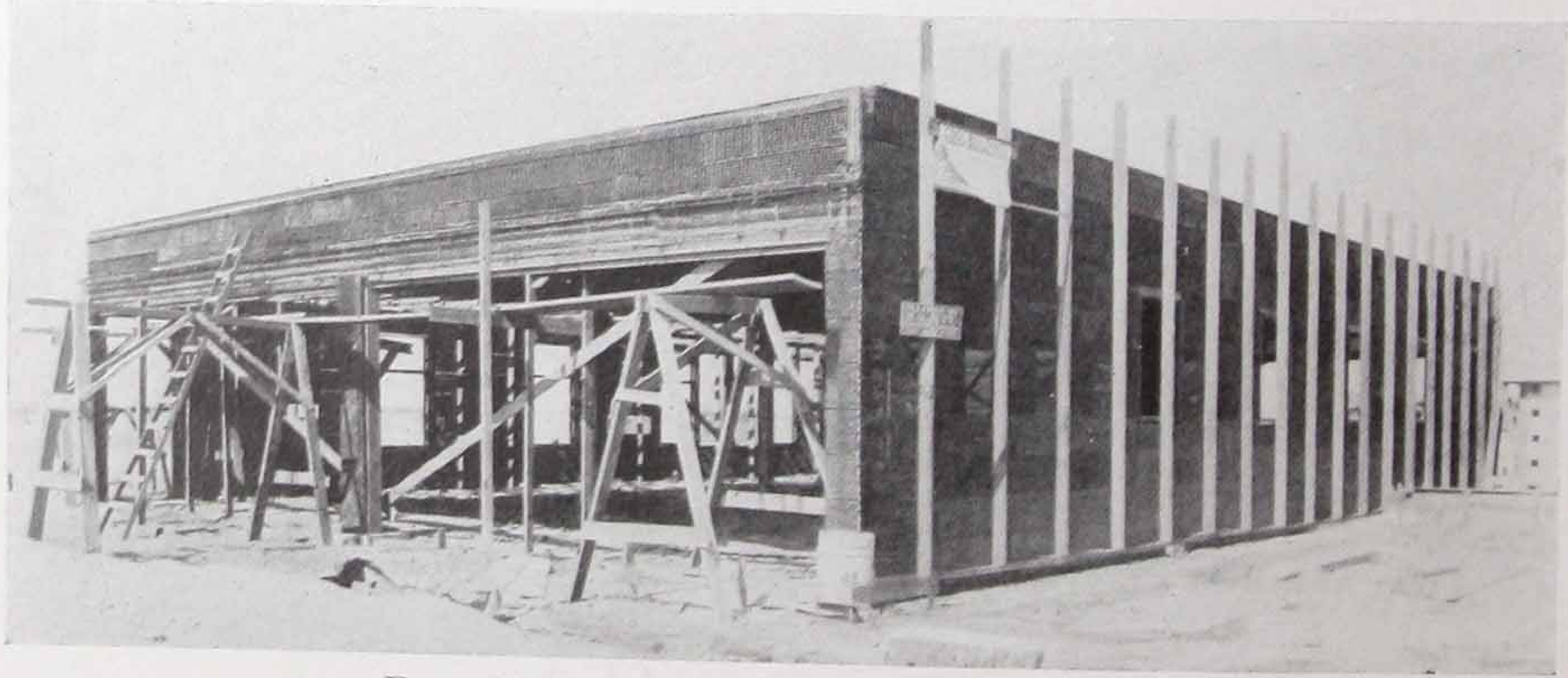


Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail

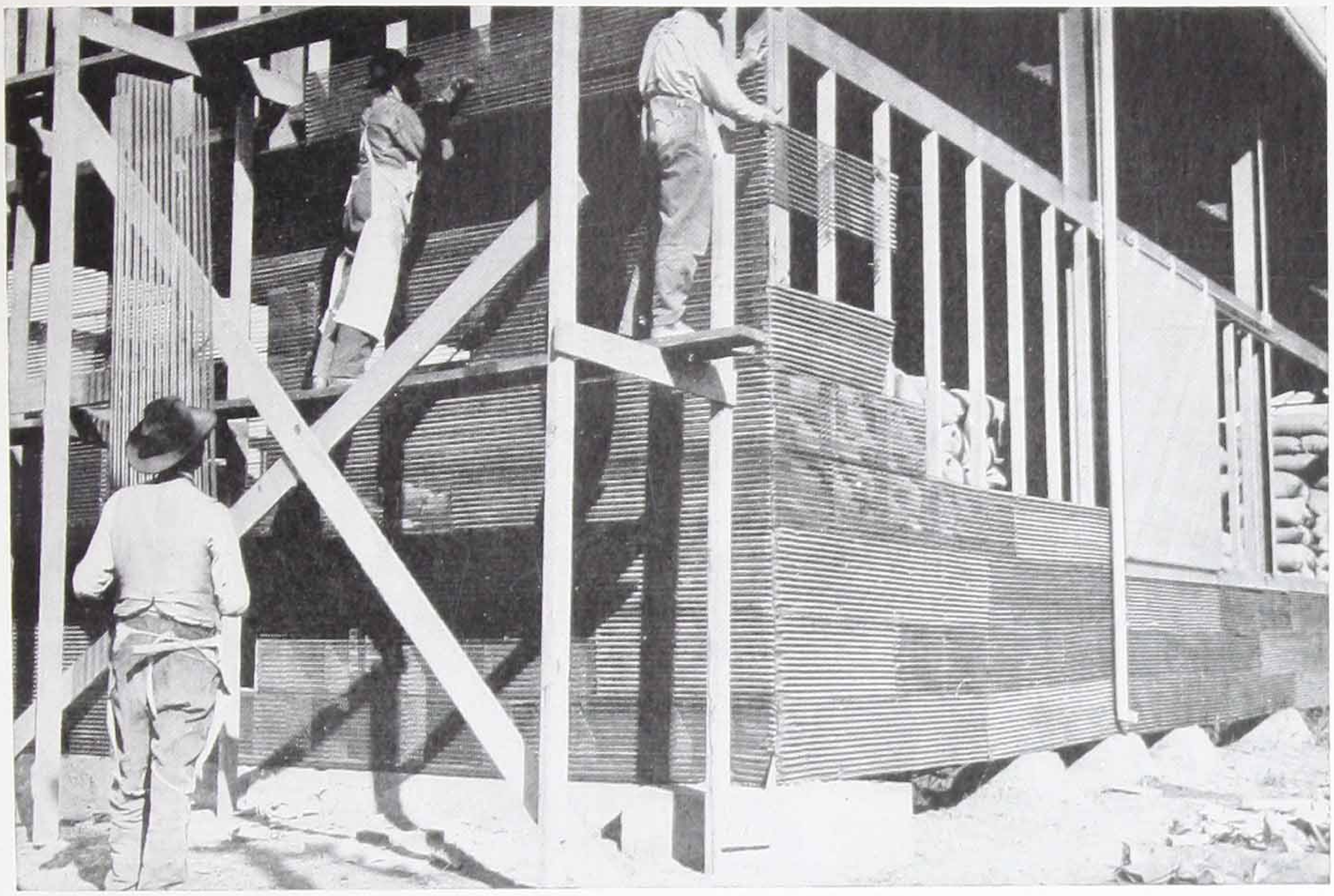


A Type of Window Much Used with Solid Trussit Walls

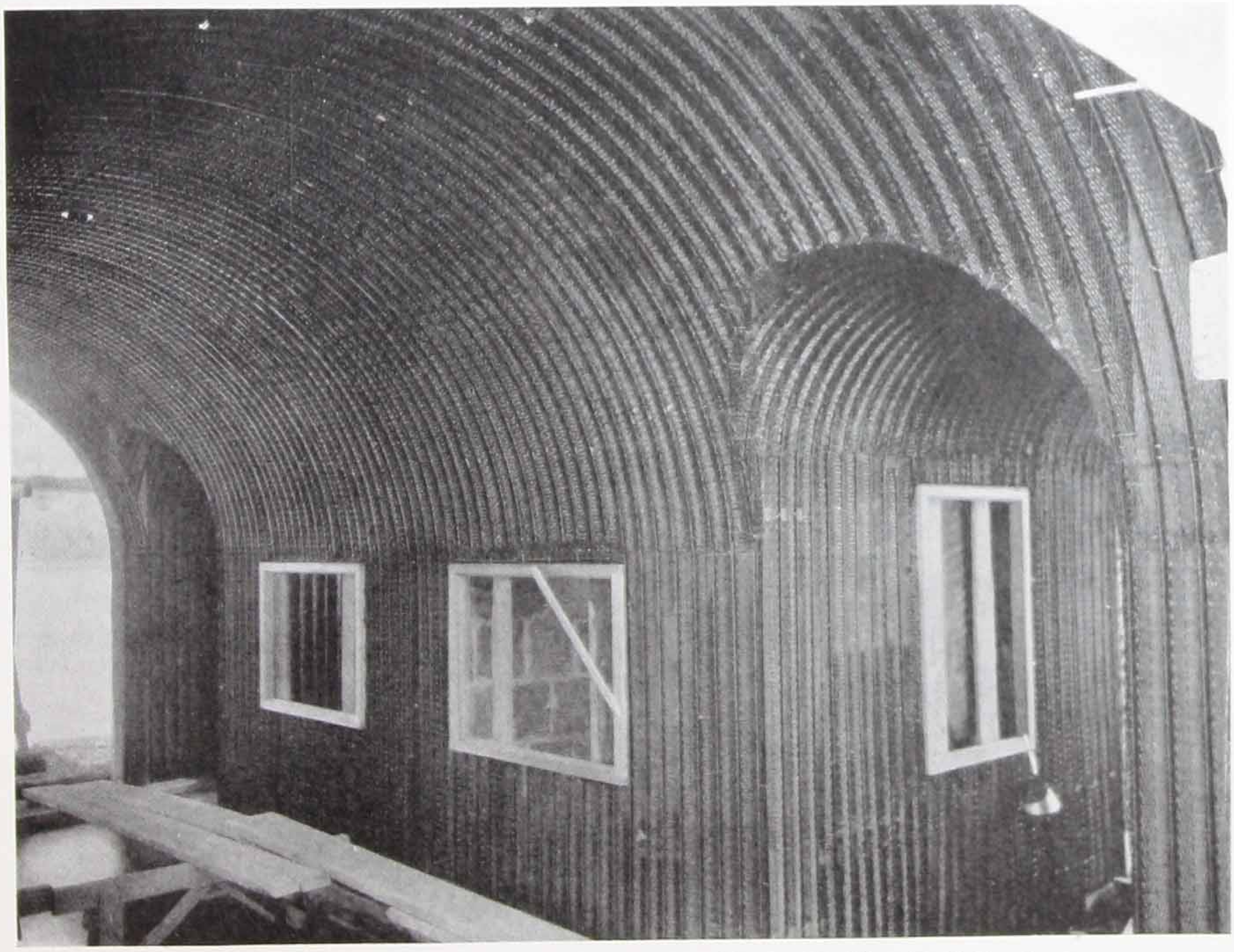
Note — Wherever Trussit is shown, Self-Sentering can be used with practically the same detail



Ernst Faure Building, Van Nuys, California
Built Entirely of Trussit with Wood Studding Inside Columns



Erecting Trussit on Wood Framing—A Milling Warehouse at Lodi, California



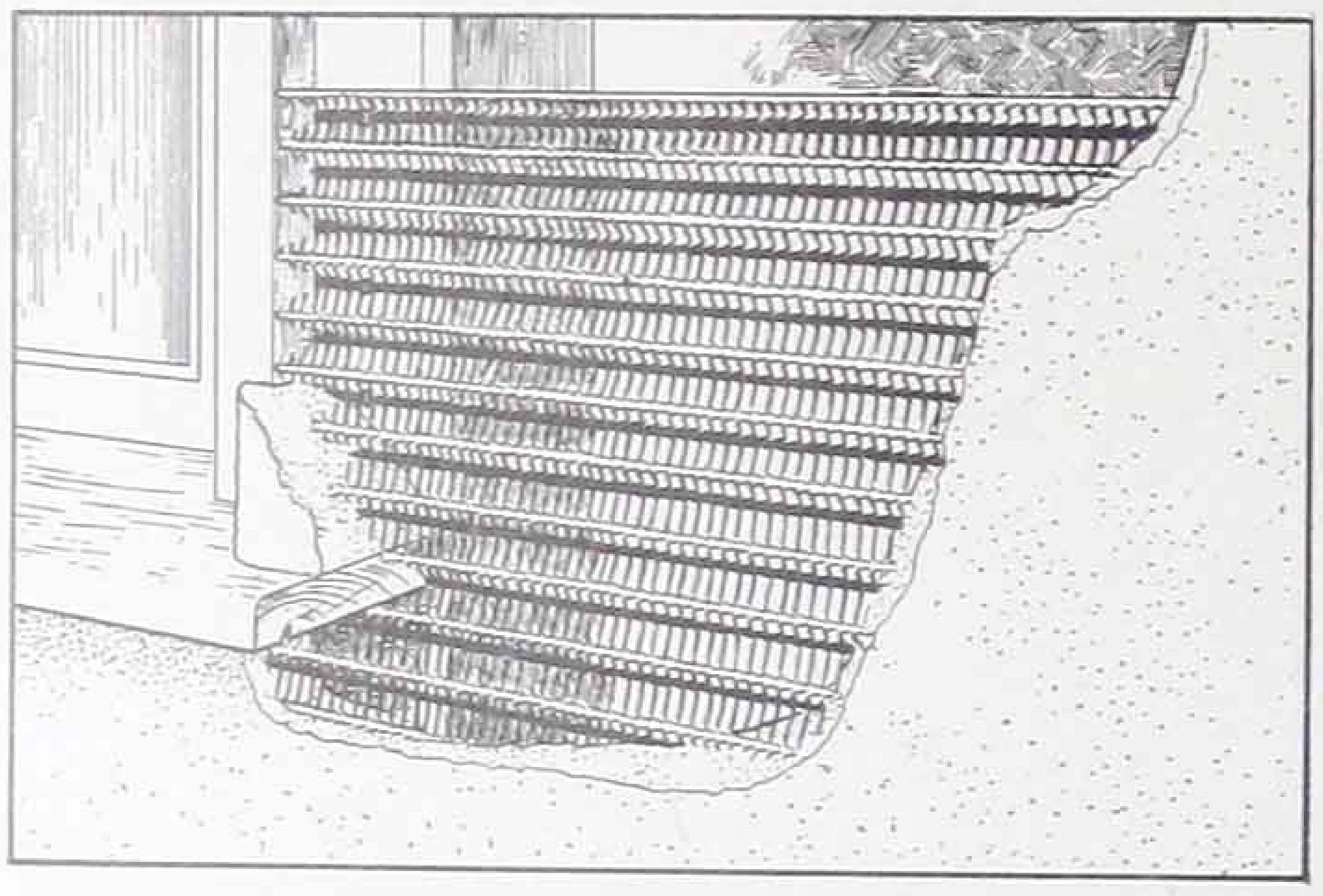
Bath House, Hiawatha Lake, Onondaga Park, N. Y. Self-Sentering for Roof, Ceiling and Partitions

Trussit in House Construction

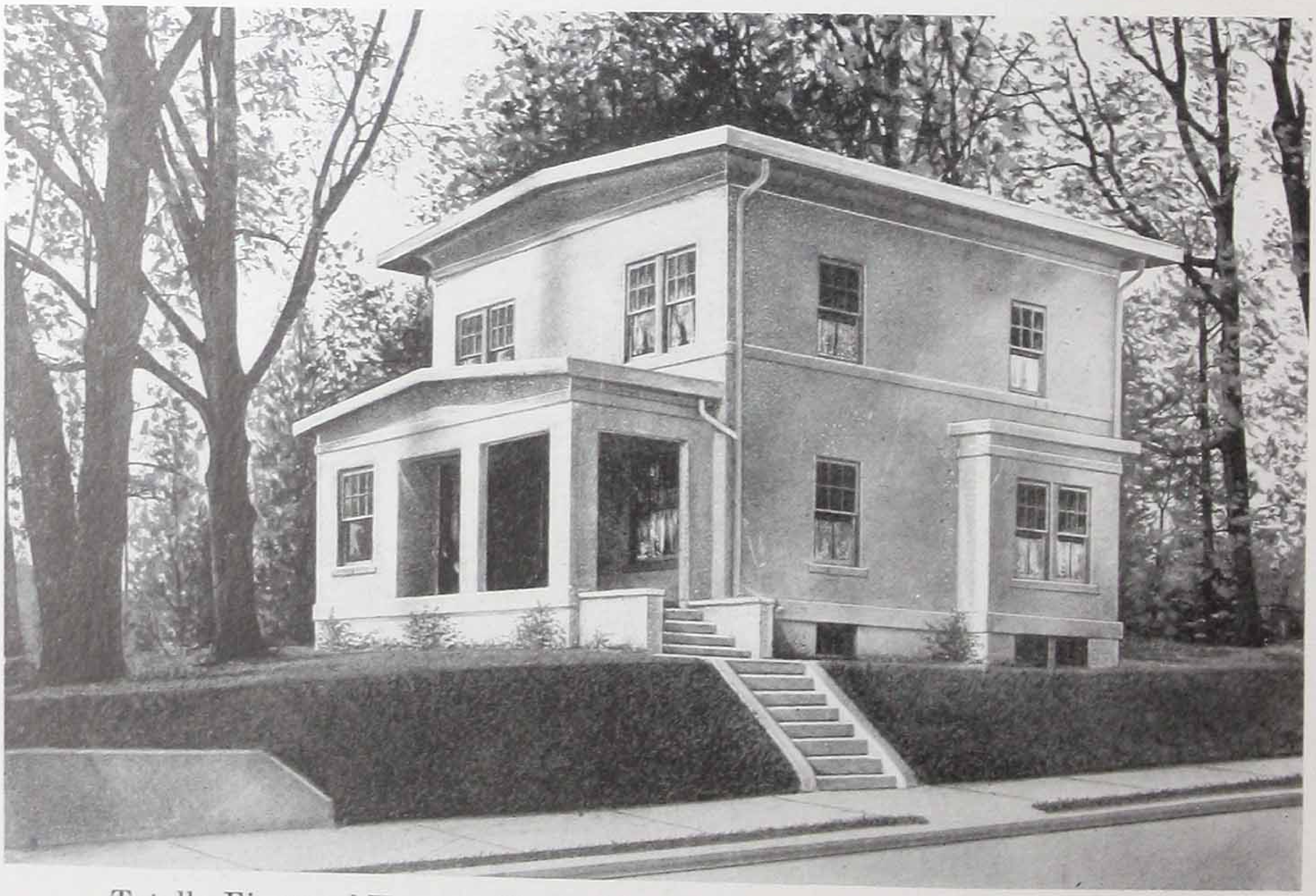
Here Trussit is erected directly over the wood studs or over the sheathing without the need of furring strips, for stucco exterior.

Because of its equal expansion in both directions, Trussit is equally distributed in the slab, giving uniform and staunch reinforcement against expansion and cracking. It is also used without studding, for non-bearing partitions, which are fireproof, soundproof and permanent, yet only 2 inches to 3 inches thick.

Below is illustrated a totally fireproof house in which Trussit was used for stucco exterior and solid partitions. Similar details for economical, semi-fireproof wood frame construction are shown.



Method of applying Trussit for stucco exteriors. Showing construction used in fireproof house below using steel studding in place of wood as here shown



Totally Fireproof House. Erected by The General Fireproofing Company, Youngstown, Ohio. Architect, Chas. F. Owsley

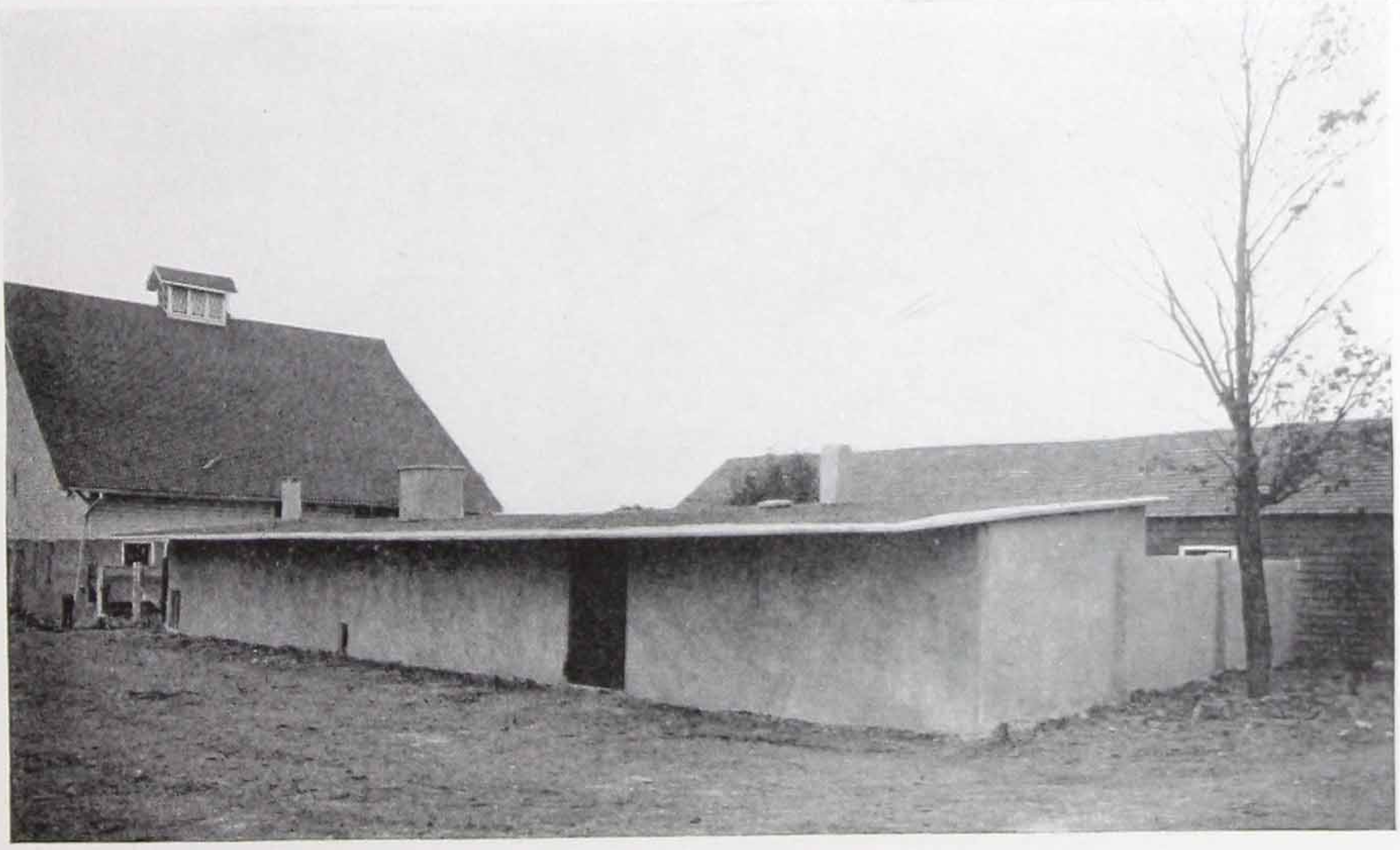
Trussit and Self-Sentering Small Buildings

FOR small outbuildings, of which there are a great many on every country estate and farm, Trussit offers a means of frameless construction, which is convenient to erect, low in cost and completely fireproof.

The chief advantage of Trussit is that it eliminates the use of studding, altogether, and permits the erection of walls and partitions only 2 inches thick, equal, for all ordinary purposes, to brick or poured concrete walls at about one-half the cost.

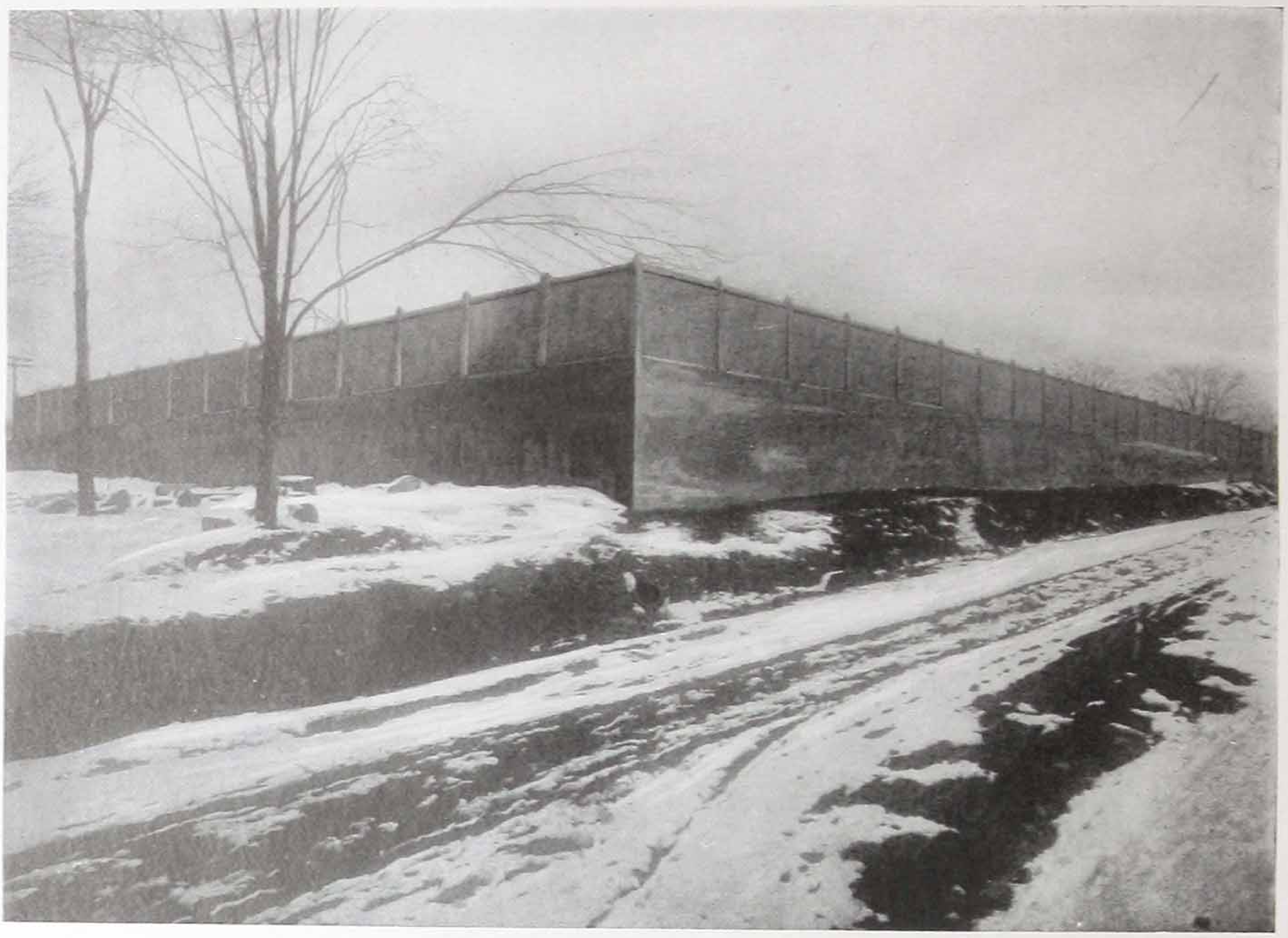
Trussit for walls and partitions in connection with Self-Sentering for roofs, gives a method of constructing small buildings which are in every way permanent and free from up-keep expense. Fences and enclosures can be made a part of the building itself, and all are clear of protruding frame work, which often takes up a great deal of valuable space inside.

The photograph below shows a Trussit and Self-Sentering frameless hog house, with a fence made as an integral part of the side wall. This same method of construction is equally adaptable to all farm buildings, small outbuildings and to garages, of the simplest as well as the most elaborate designs.



Hog house and fence on the farm of F. F. Ingram, Grosse Isle, Mich.
Trussit for sidewalls and fence, Self-Sentering for roof

Trussit or Self-Sentering Fences and Railings



Concrete Fence, Athletic Field, Allegheny College, Meadville, Pa.

The Trussit or Self-Sentering fence, while chiefly used for the enclosure of athletic fields, ball parks, amusement parks, etc., is very well adapted for private use, or in fact, any place where a permanent fence is required or where an attractive appearance will be appreciated.

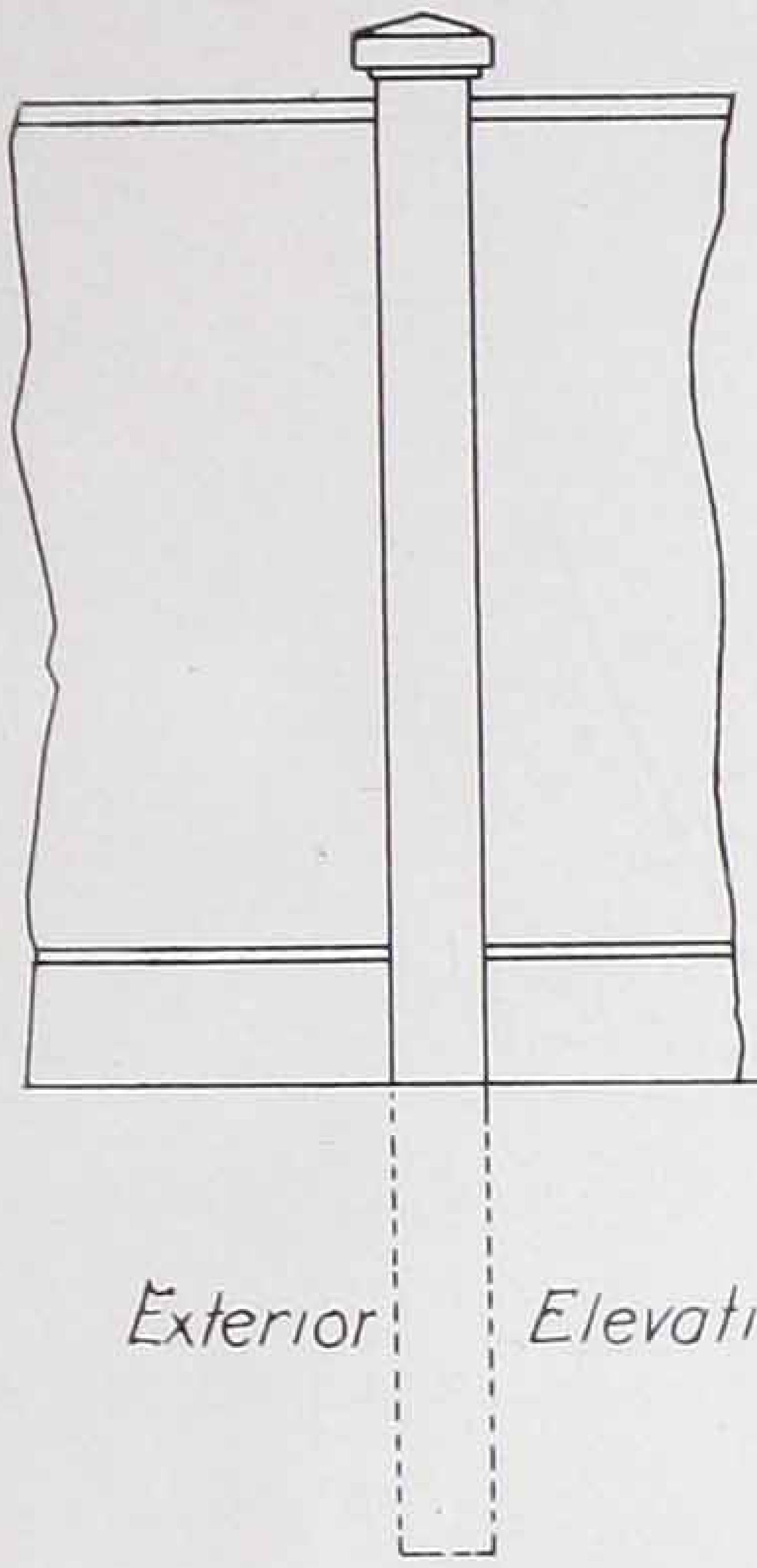
Such a fence is made from Trussit or Self-Sentering, plastered on both sides with cement mortar in the same manner as for exterior walls. The posts may be made from Trussit or Self-Sentering with ribs running vertically and the sheets curved or bent to the form of post desired; plastered on the outside and filled with concrete.

This fence, properly constructed, never requires repairs or painting and gives an appearance of age and stability only equalled by the old-time stone wall, the cost of which is prohibitive in most cases.

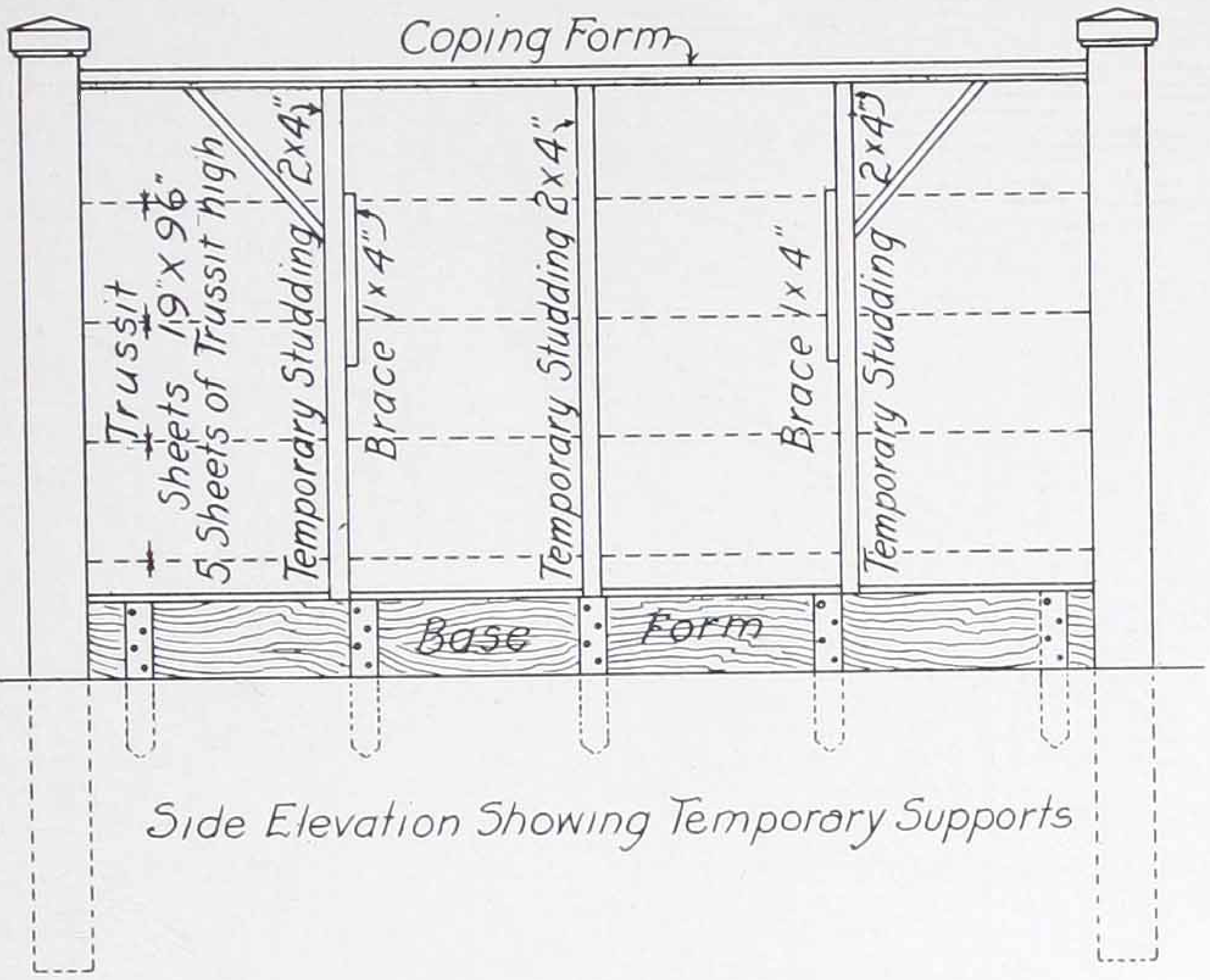
Trussit or Self-Sentering railings for bridges and inclined runways are made in the same manner and the fact that they are built without forms of any kind makes them much less expensive than the ordinary concrete railings used for this purpose.

Details of Trussit or Self-Sentering Fence

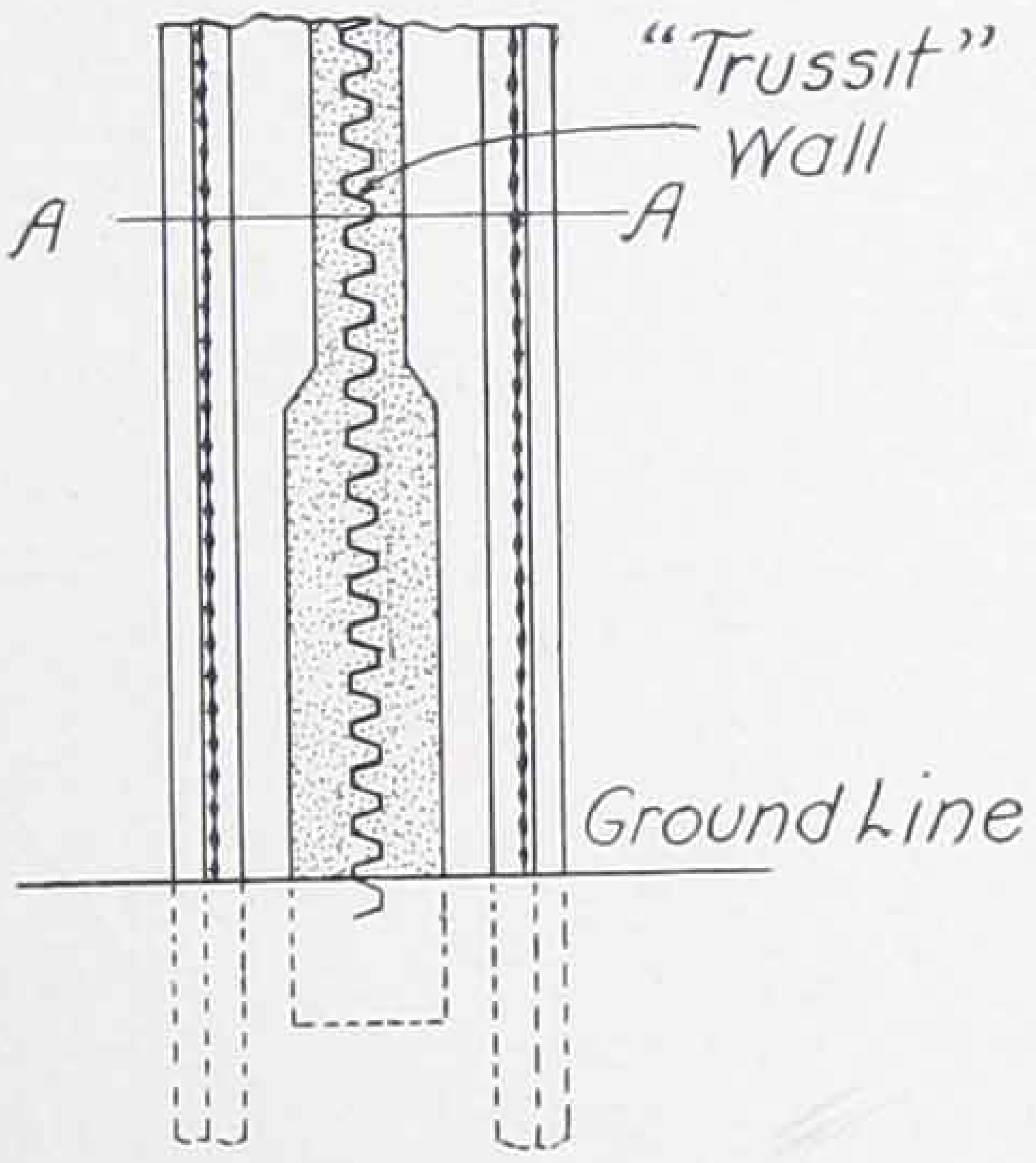
Trussit or Self-Sentering Used for Panels and Posts

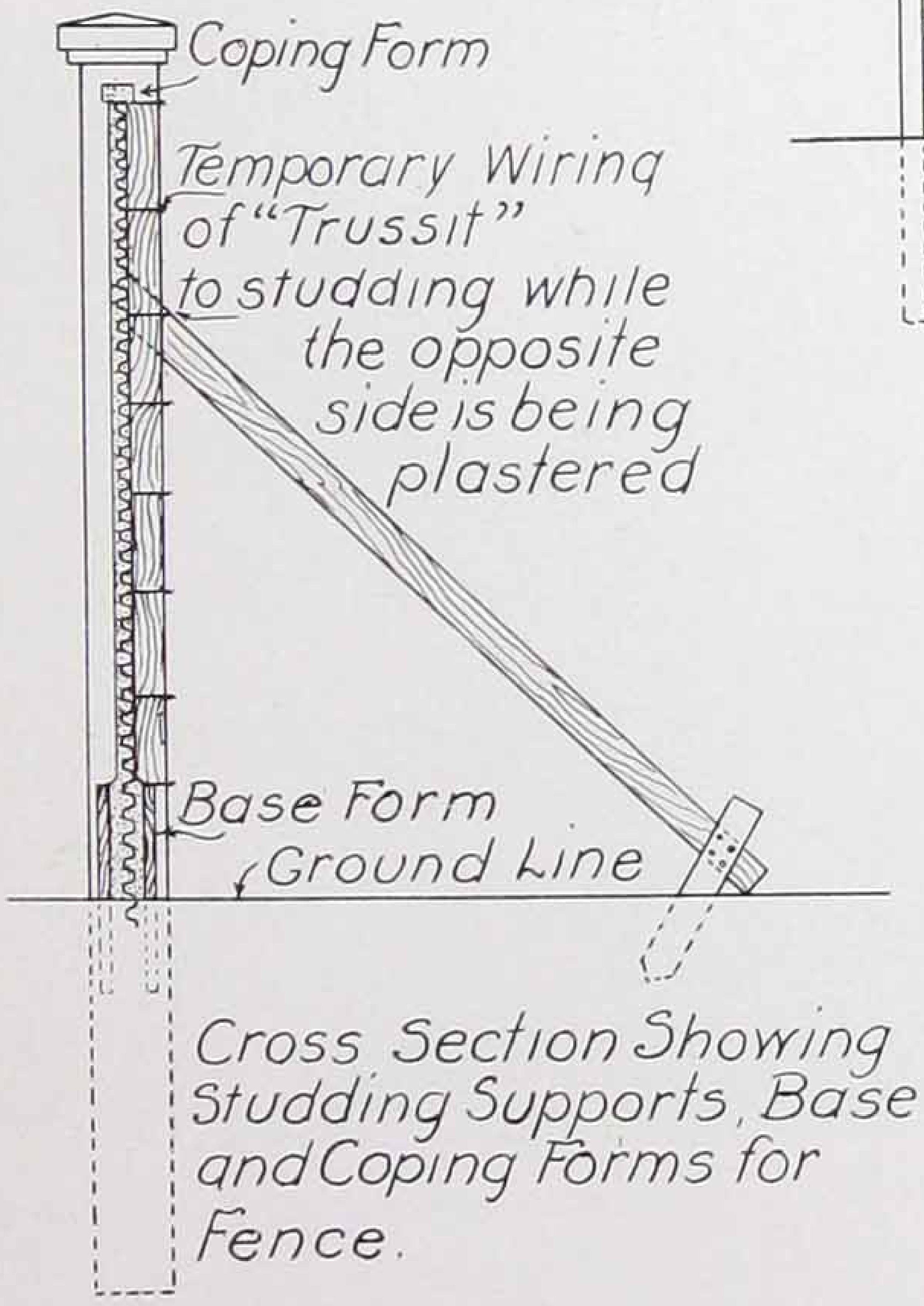


Exterior Elevation

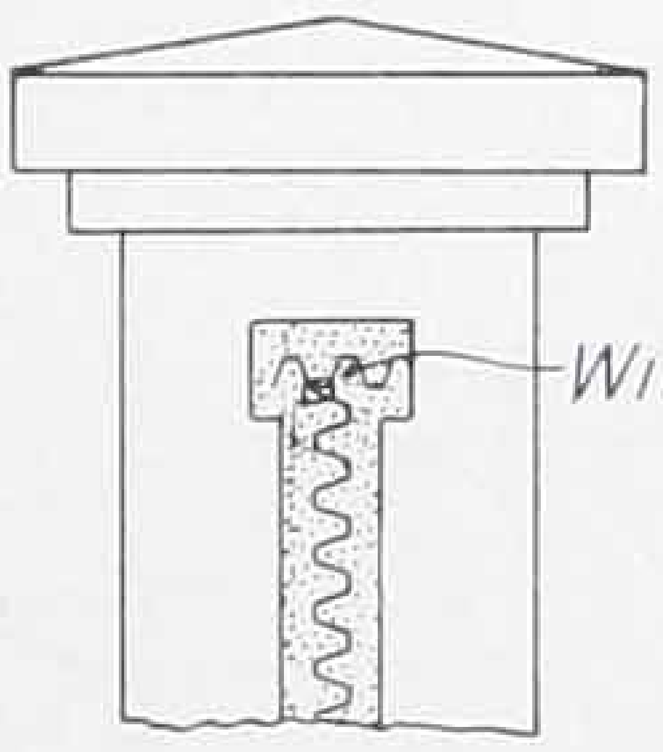


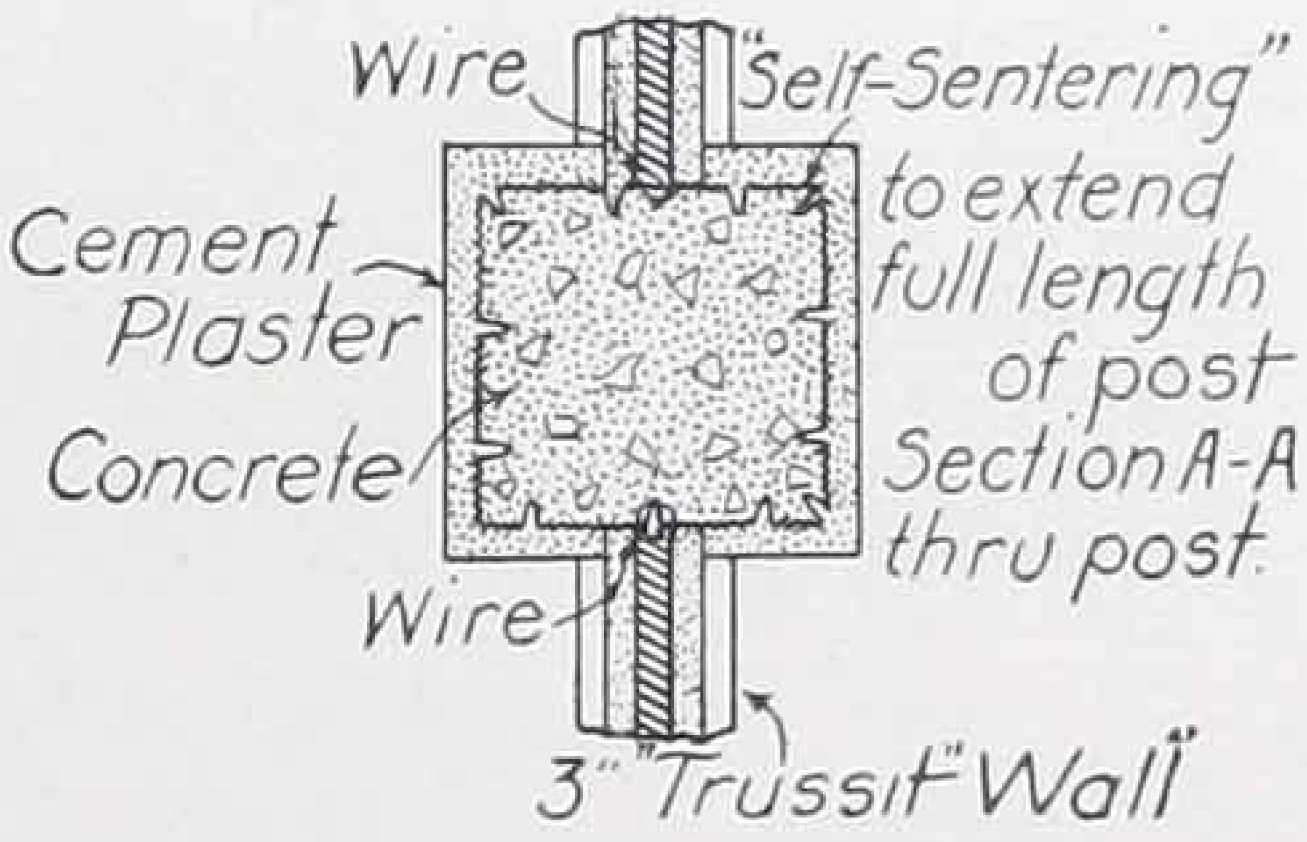
Side Elevation Showing Temporary Supports

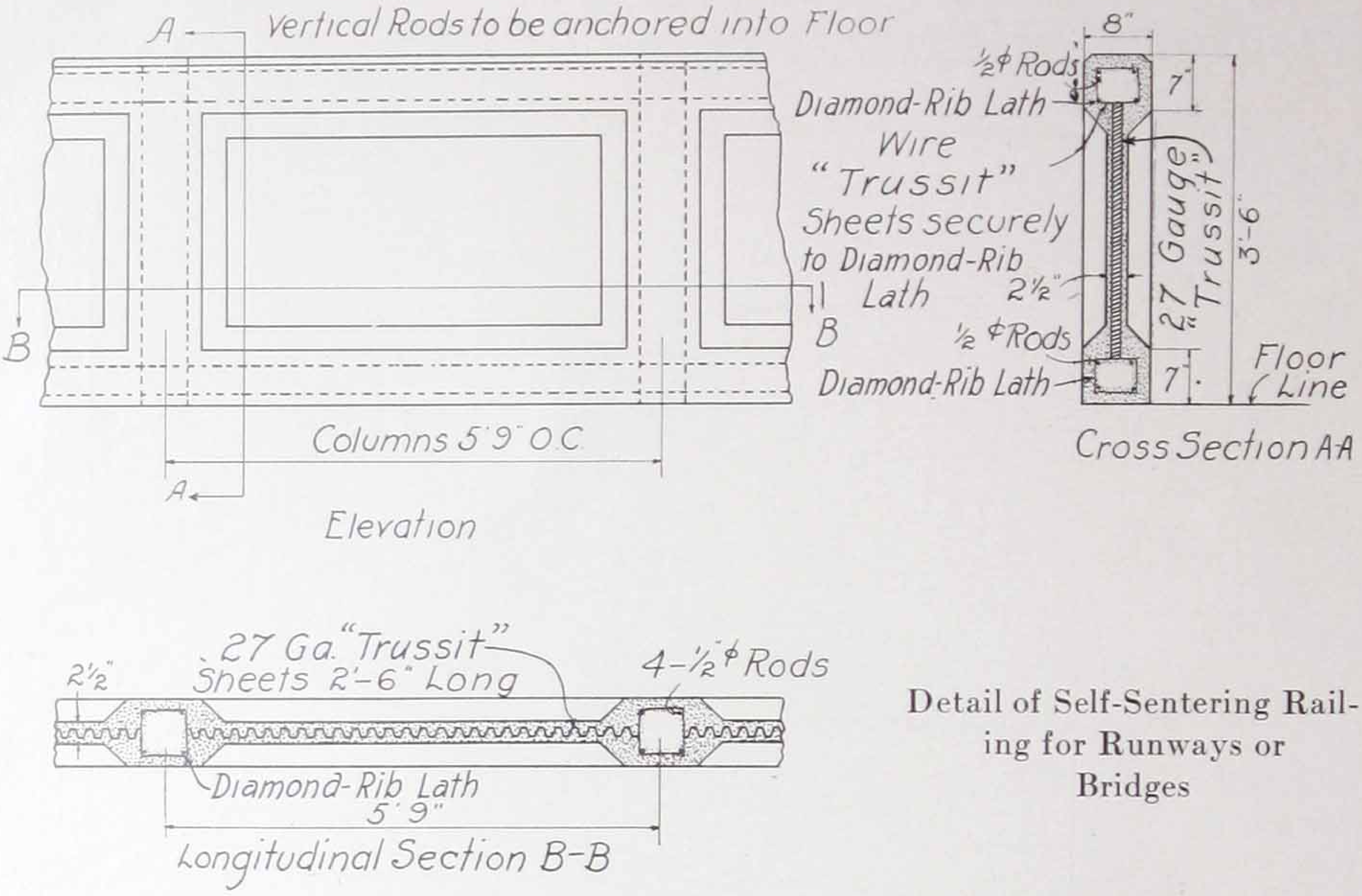



Coping Form
Temporary Wiring of "Trussit" to studding while the opposite side is being plastered
Base Form
Ground Line

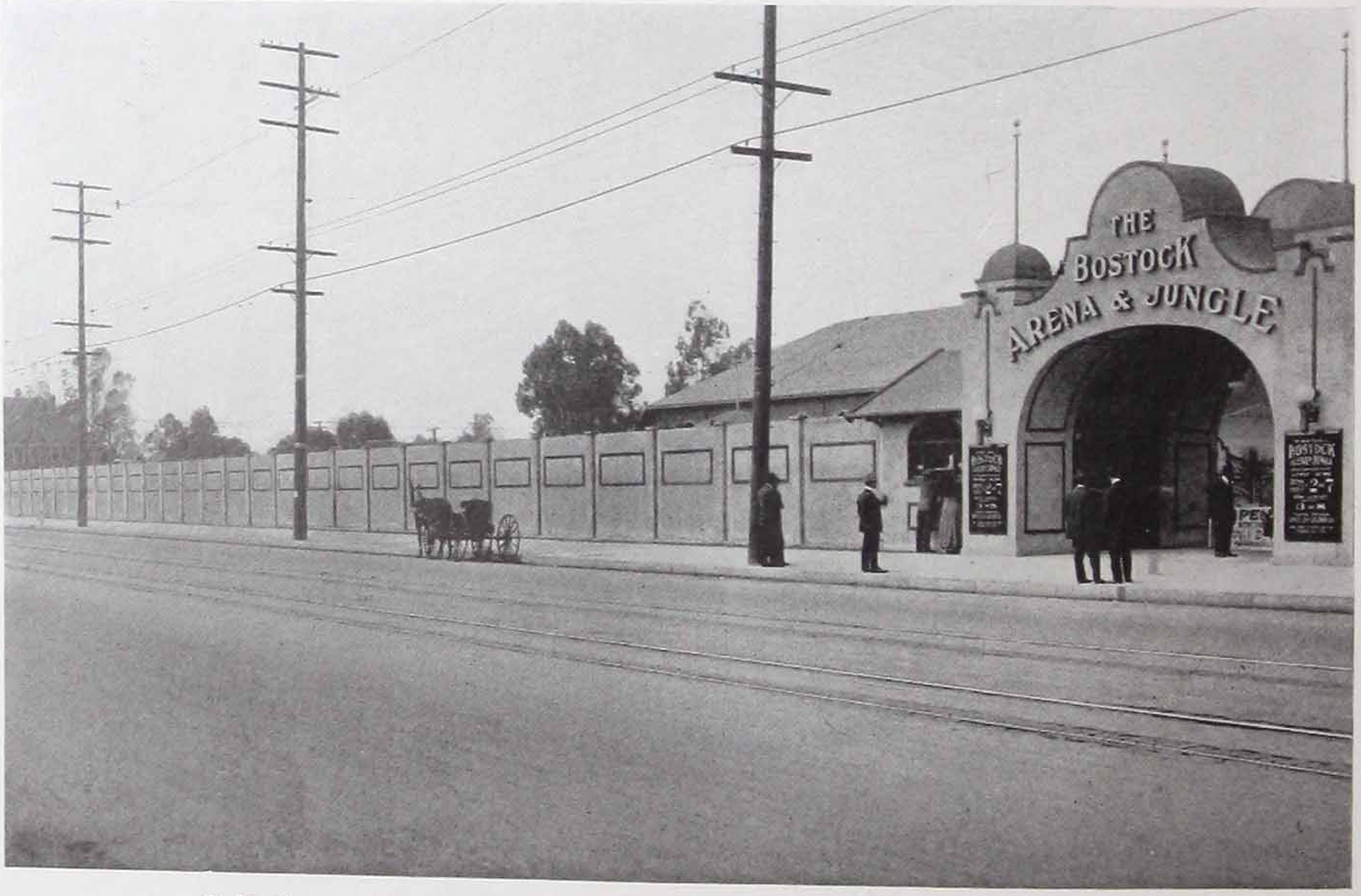
Cross Section Showing Studding Supports, Base and Coping Forms for Fence.







Detail of Self-Sentering Railing for Runways or Bridges

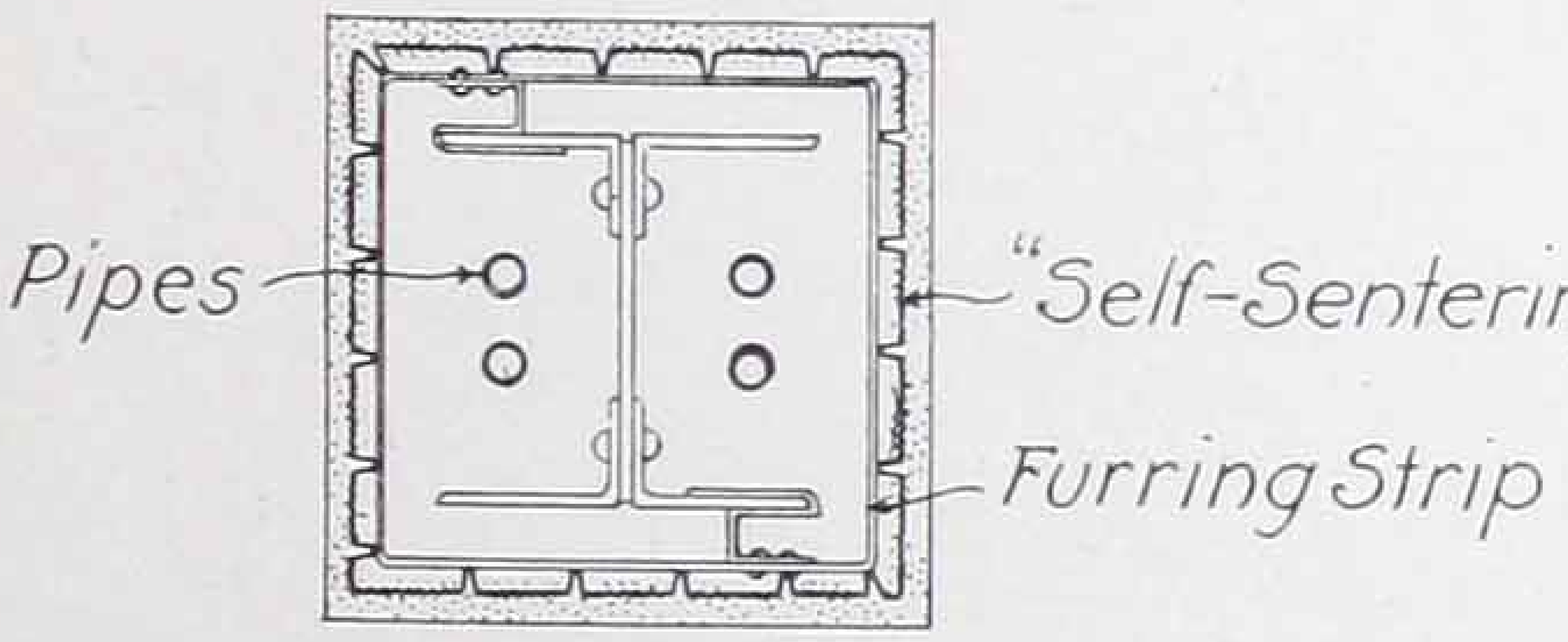


Self-Sentering Fence Enclosing The Bostock Arena & Jungle, Los Angeles, Cal.

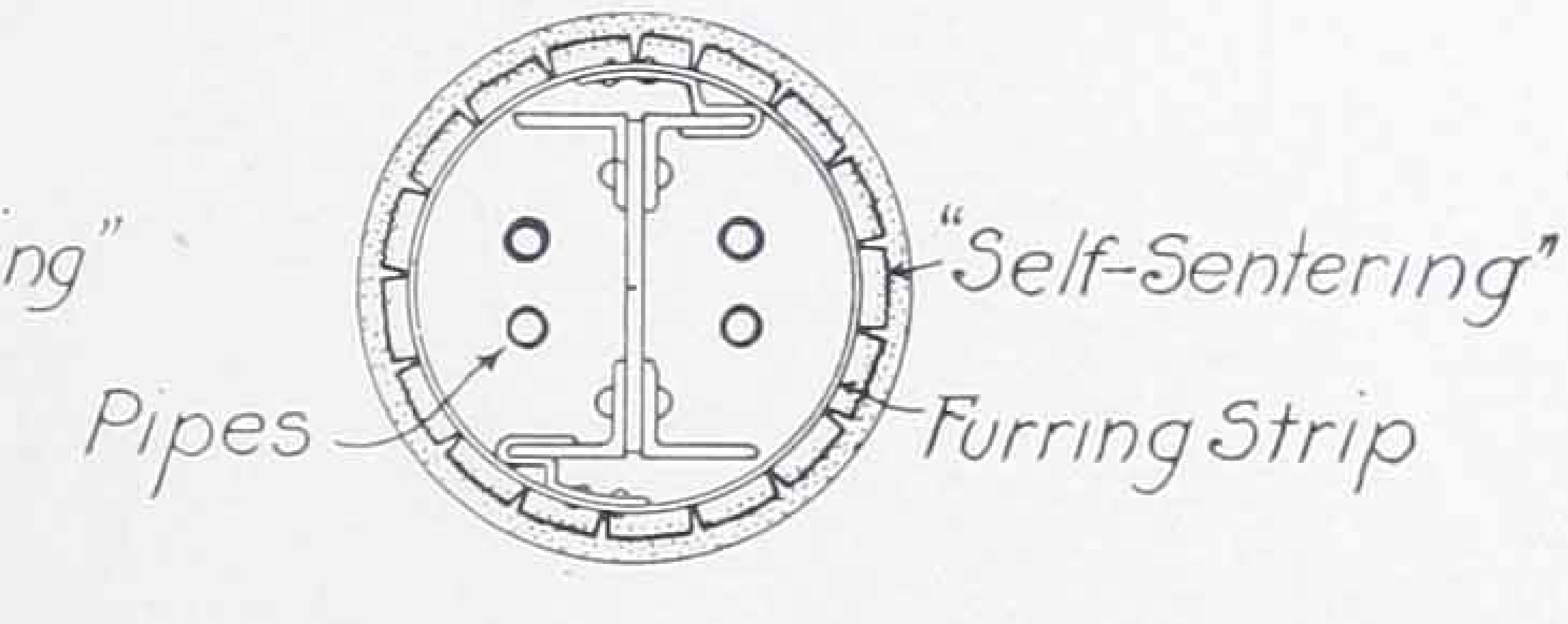
Self-Sentering for Beam and Column Protection, False Columns and Posts

In the fireproofing of steel columns and beams, the heavy ribs of Self-Sentering placed against the structural members act as furring strips to give the necessary air space, while the tough, pliant nature of the connecting mesh permits the material to be easily worked and formed to the required outline. The mesh forms a perfect plastering surface and the ribs, in addition to taking the place of furring strips ordinarily required, because of their close spacing ($3\frac{5}{8}$ inches center to center) give the strength necessary to safely support the heavy plaster load which should be used.

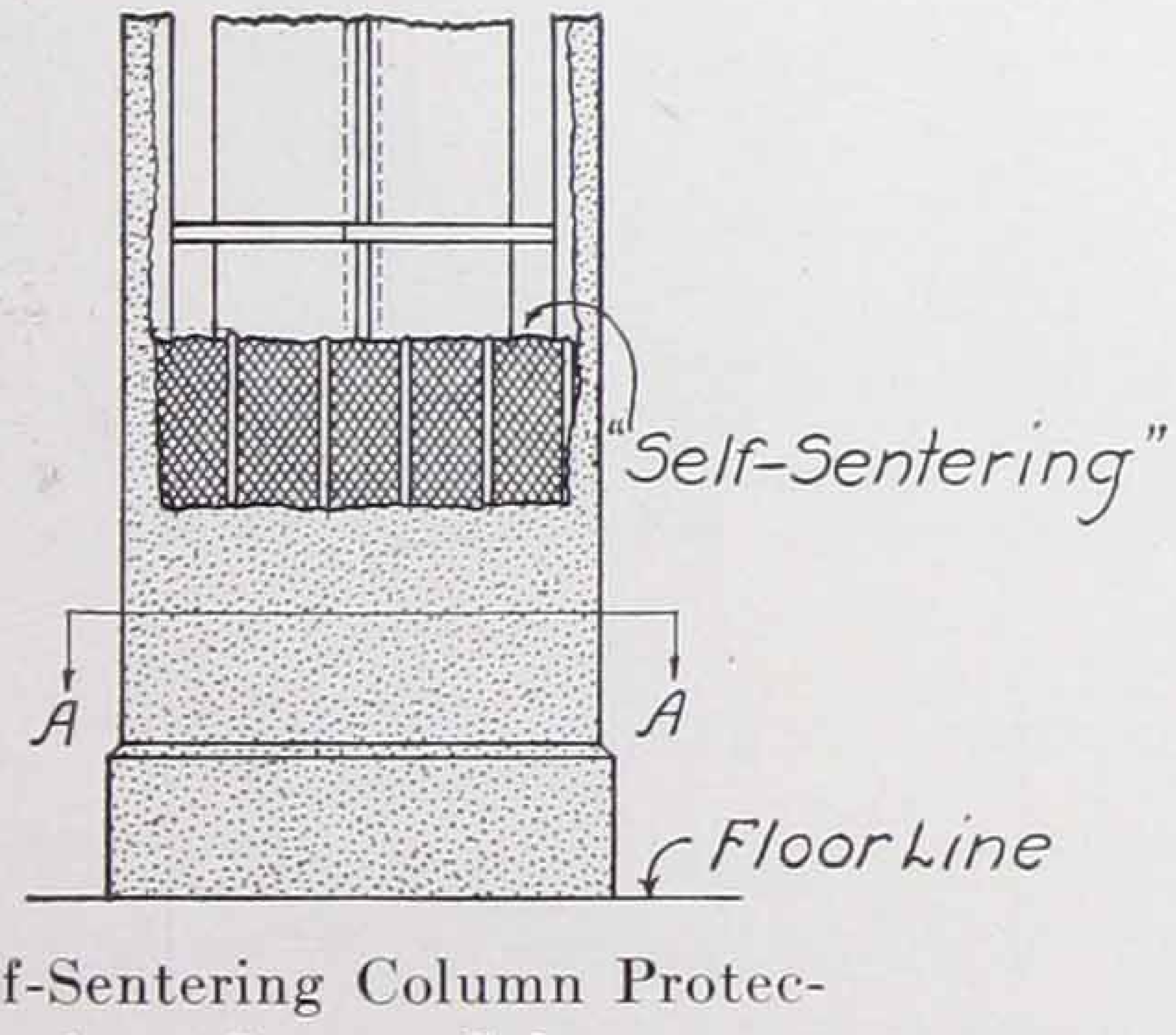
In the construction of posts and false columns, Self-Sentering can be folded to the desired shape (see detail on fence posts on page 75), stood on end, secured in place and plastered without other supports. For posts, this shell can be filled with concrete after the plaster has set. The absence of forms for such work will be found to affect a considerable saving, while the finished appearance will be far superior to the poured type.



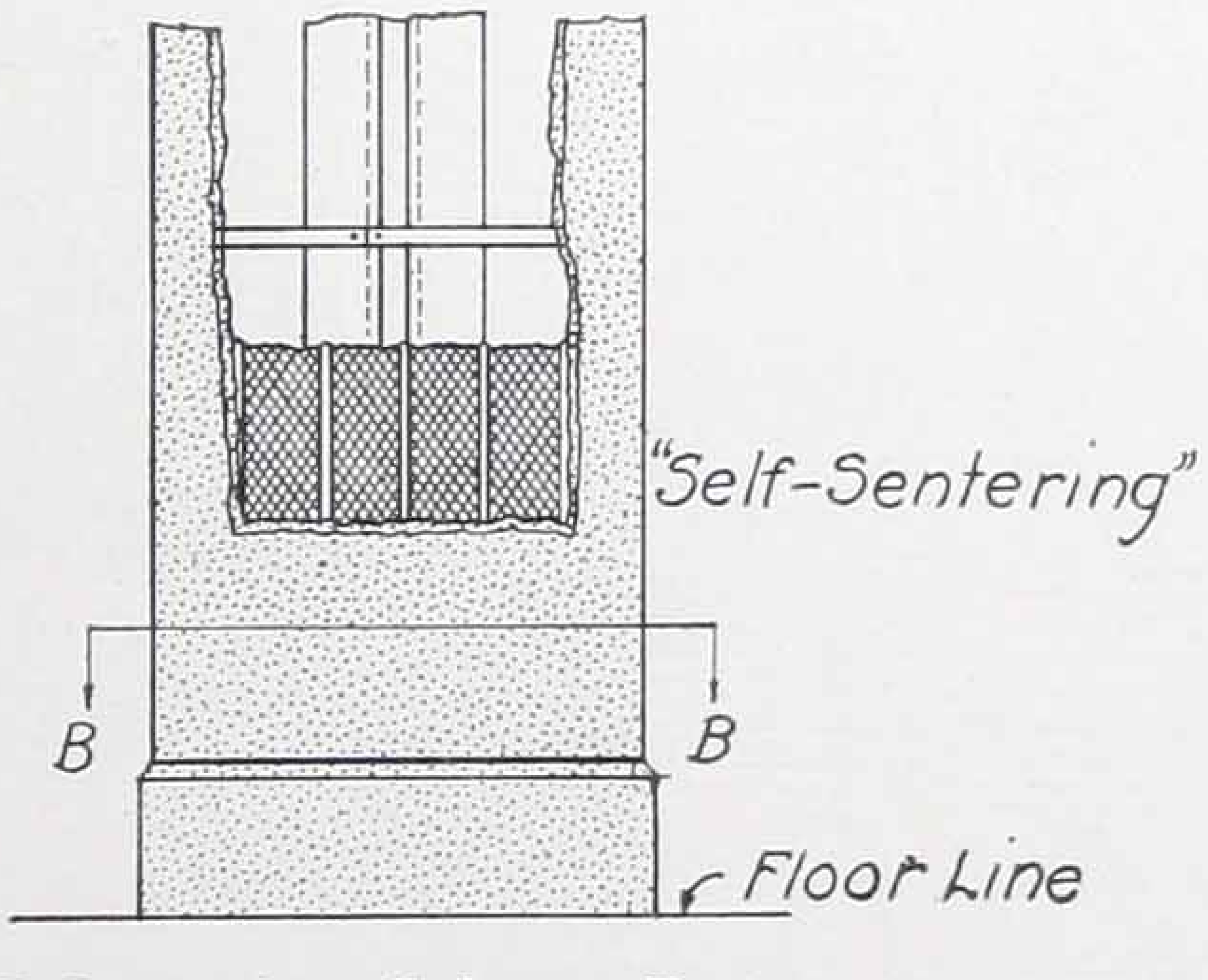
Cross Section A-A



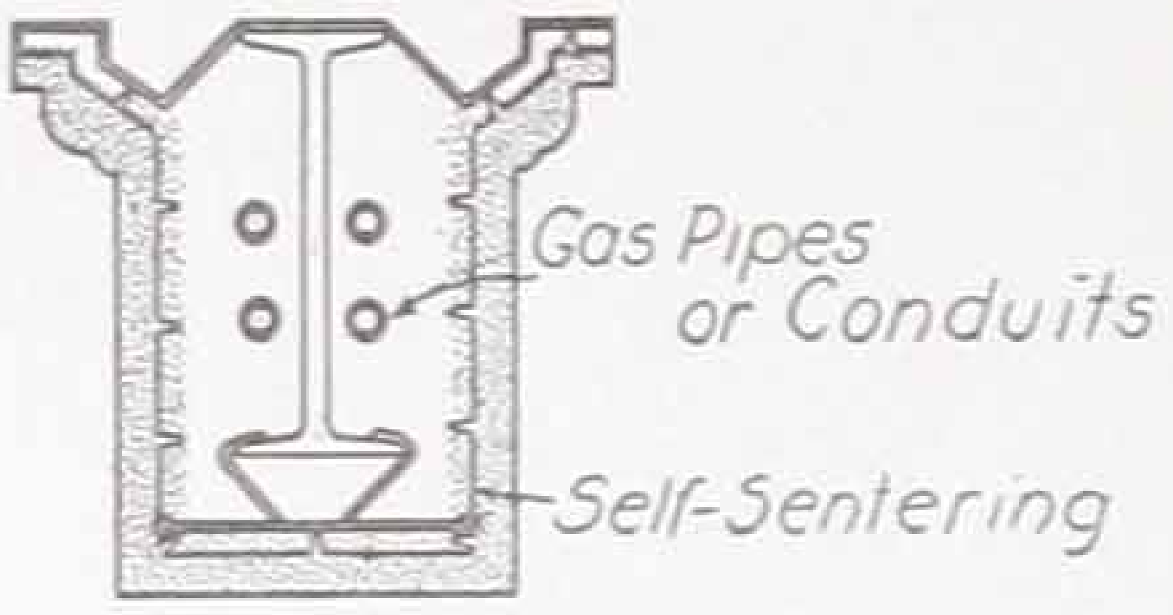
Cross Section B-B



Self-Sentering Column Protection—Square Columns

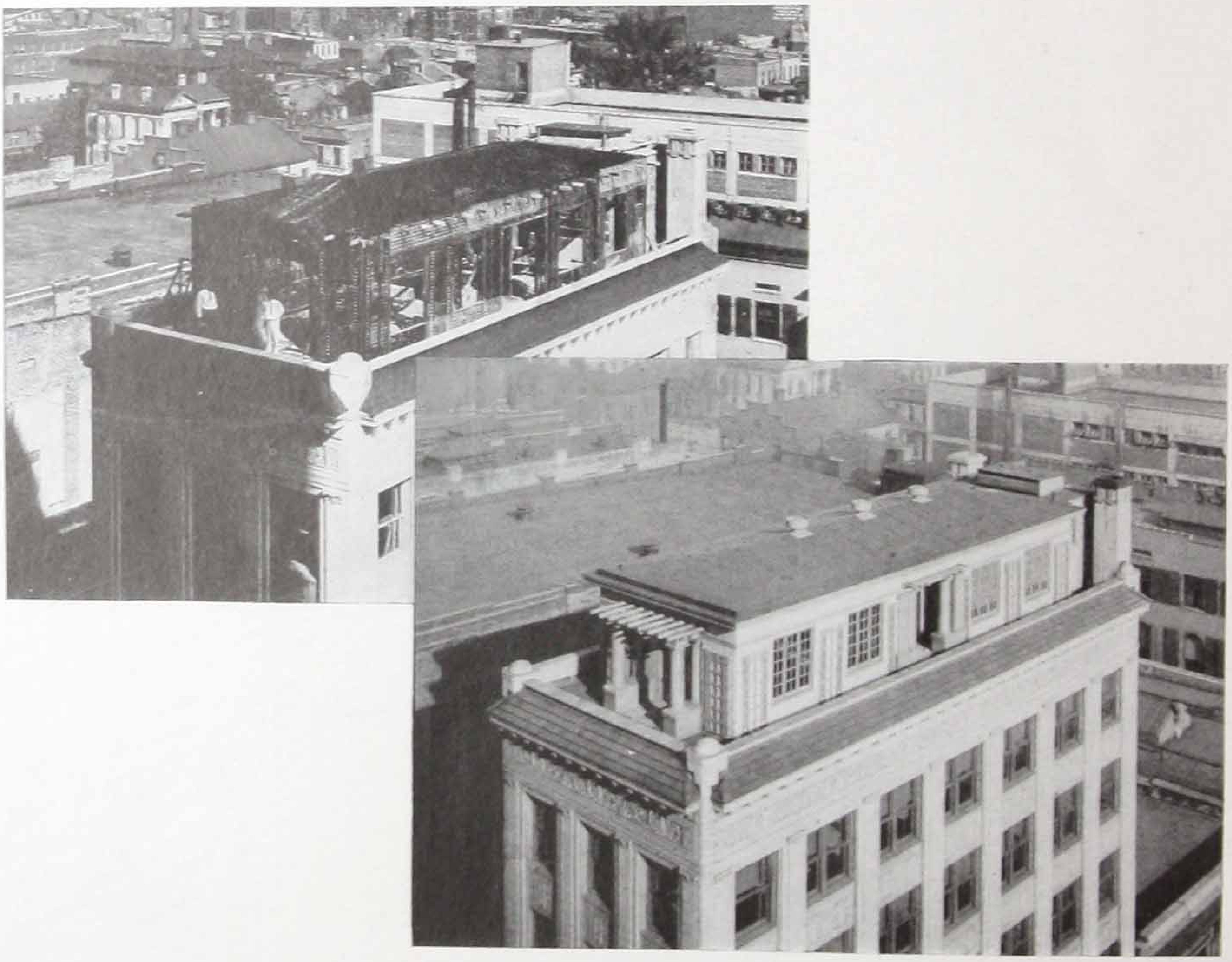


Self-Sentering Column Protection—Round Columns



Detail showing False Beam Construction

For false beam work, Self-Sentering takes the place of both lath and furring. The only framing required will be the brackets to give the desired shape to the beams. These brackets on straight work can be spaced in the same manner as the supports for suspended ceilings. (See specifications, page 47). Heavy plaster loads are entailed by the decorative effect brought out in false beam work and Self-Sentering with its closely spaced, heavy ribs affords the best carrying surface to support this load. Its perfect flexibility makes it easily shaped to conform to the curves and angles necessary with no danger of fracture of the metal.

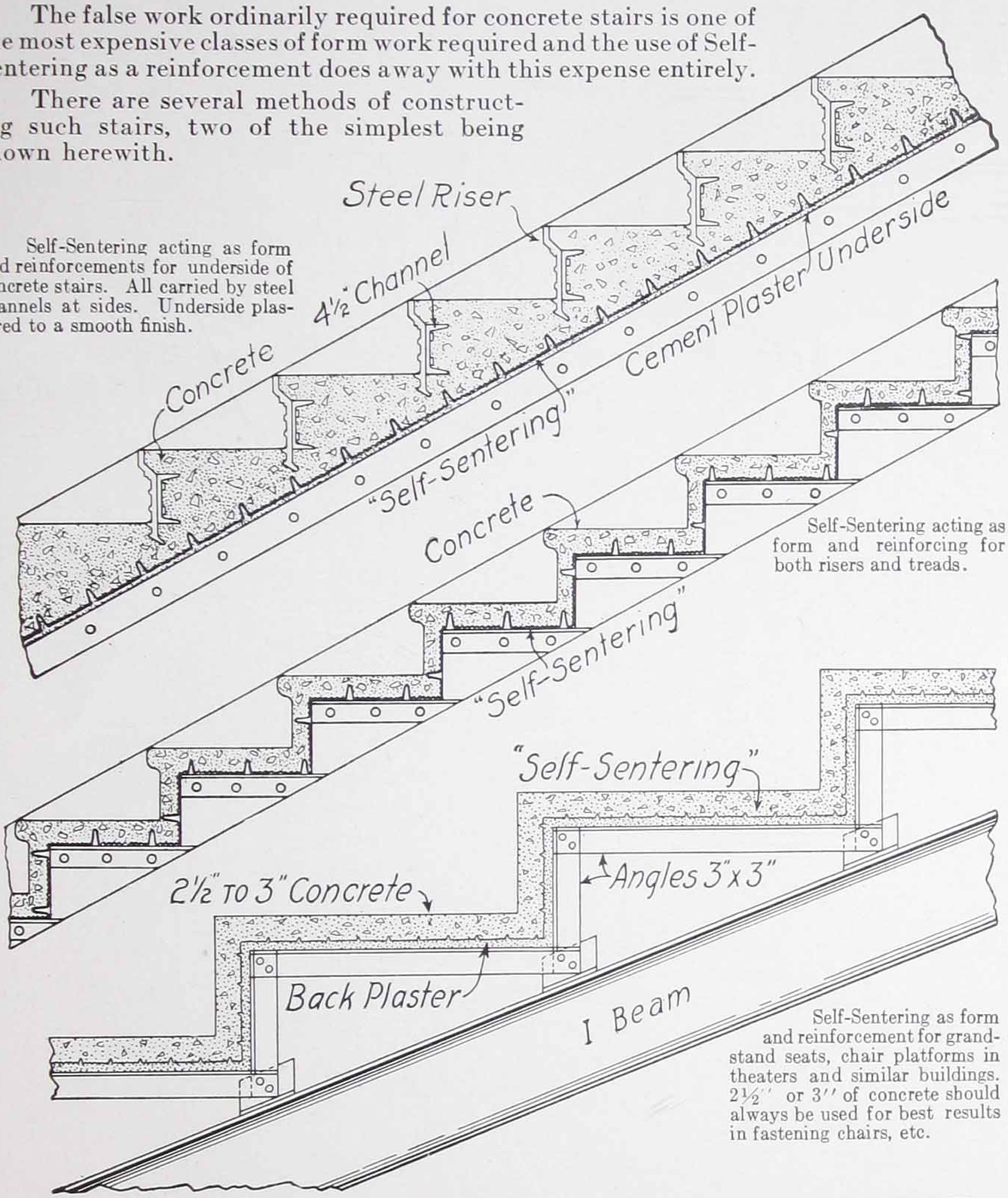


Showing novel use of Self-Sentering. This is the artistic, fireproof office of Architects Price, Broadwell & Mahan, Memphis, Tenn., erected on top of one of the prominent office buildings.

Self-Sentering for Steps, Stairs and Seat Risers

The false work ordinarily required for concrete stairs is one of the most expensive classes of form work required and the use of Self-Sentering as a reinforcement does away with this expense entirely.

There are several methods of constructing such stairs, two of the simplest being shown herewith.

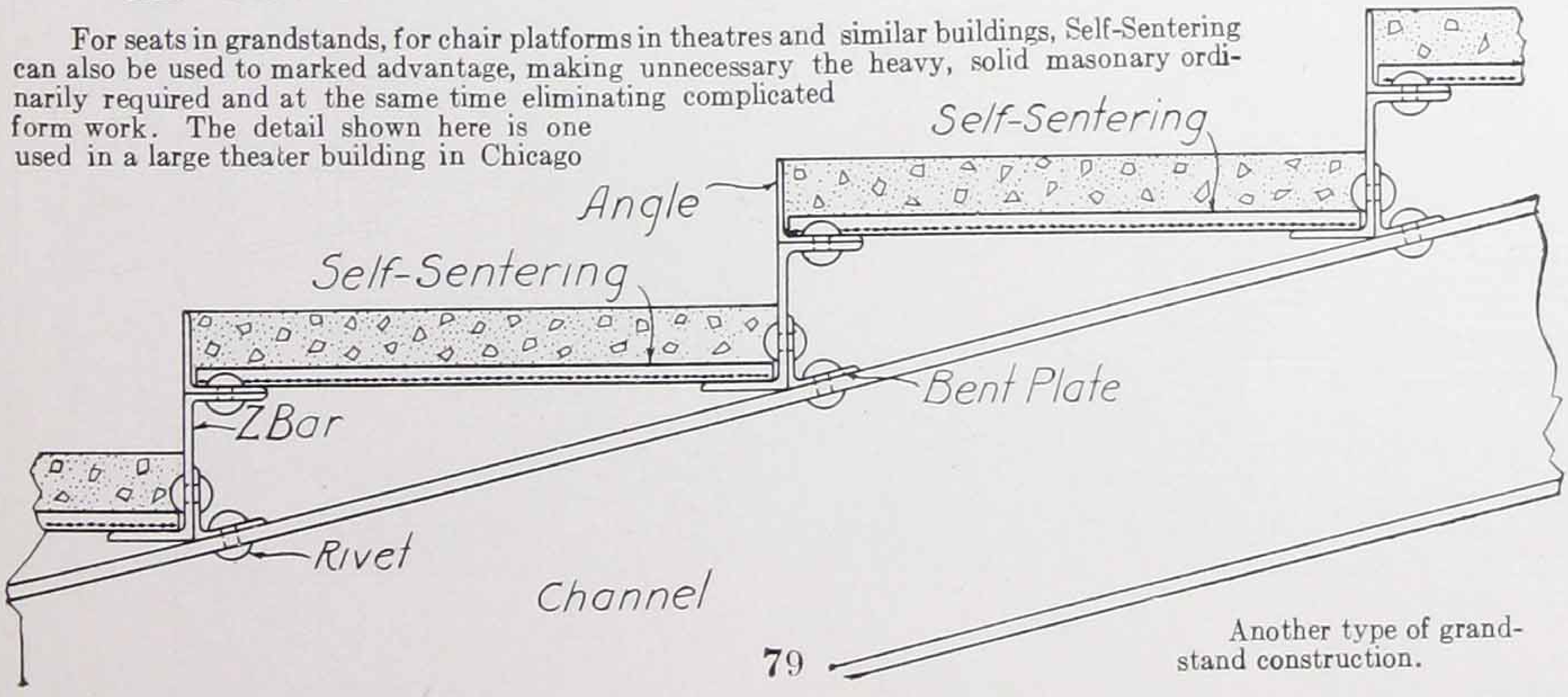


Self-Sentering acting as form and reinforcements for underside of concrete stairs. All carried by steel channels at sides. Underside plastered to a smooth finish.

Self-Sentering acting as form and reinforcing for both risers and treads.

Self-Sentering as form and reinforcement for grandstand seats, chair platforms in theaters and similar buildings. 2½'' or 3'' of concrete should always be used for best results in fastening chairs, etc.

For seats in grandstands, for chair platforms in theatres and similar buildings, Self-Sentering can also be used to marked advantage, making unnecessary the heavy, solid masonary ordinarily required and at the same time eliminating complicated form work. The detail shown here is one used in a large theater building in Chicago



Another type of grandstand construction.

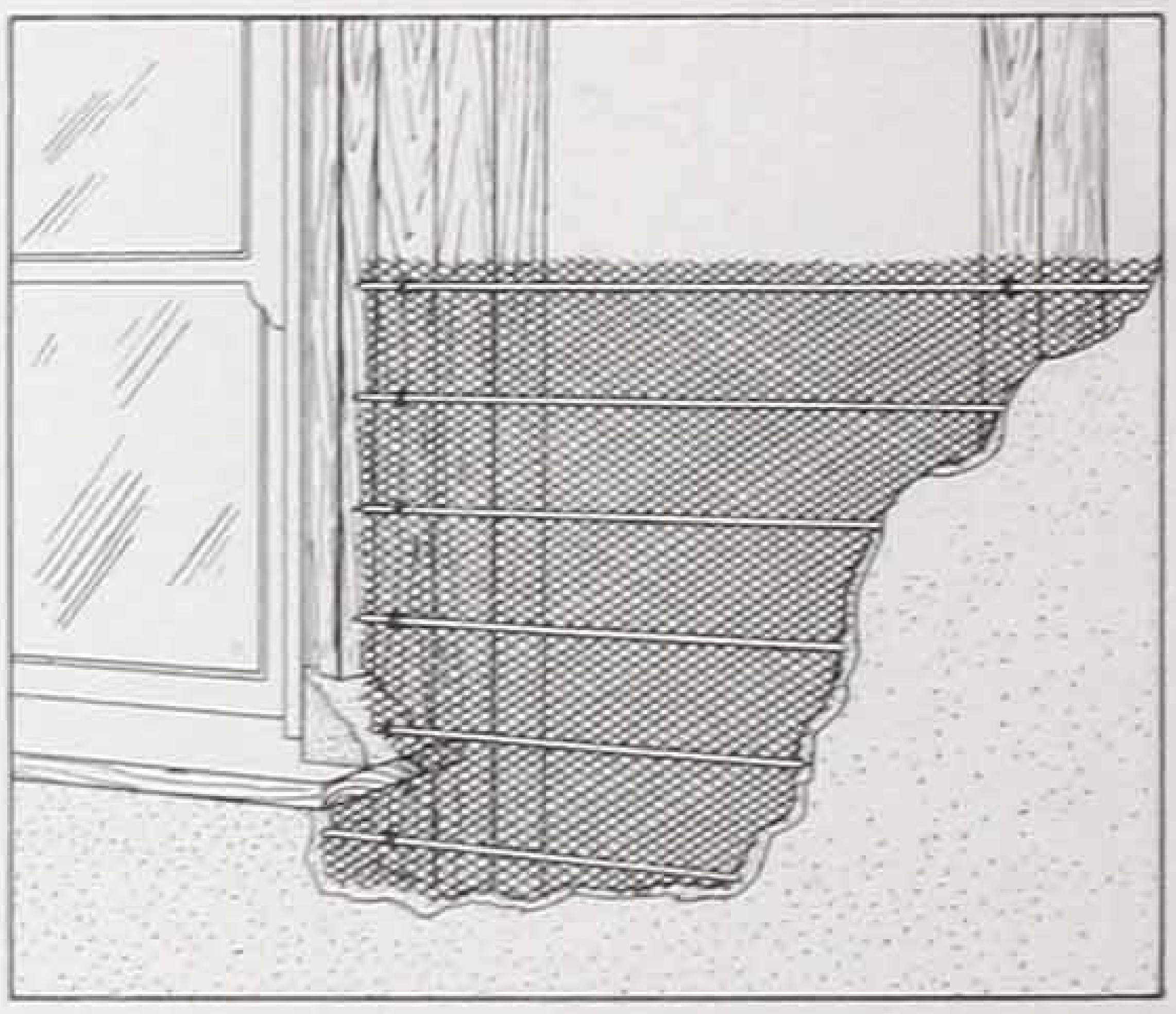
Self-Sentering for Stucco Exteriors

FOR stucco exteriors Self-Sentering acts as both lath and furring. It is, therefore, equally adaptable to use over studding, sheathing, brick or tile.

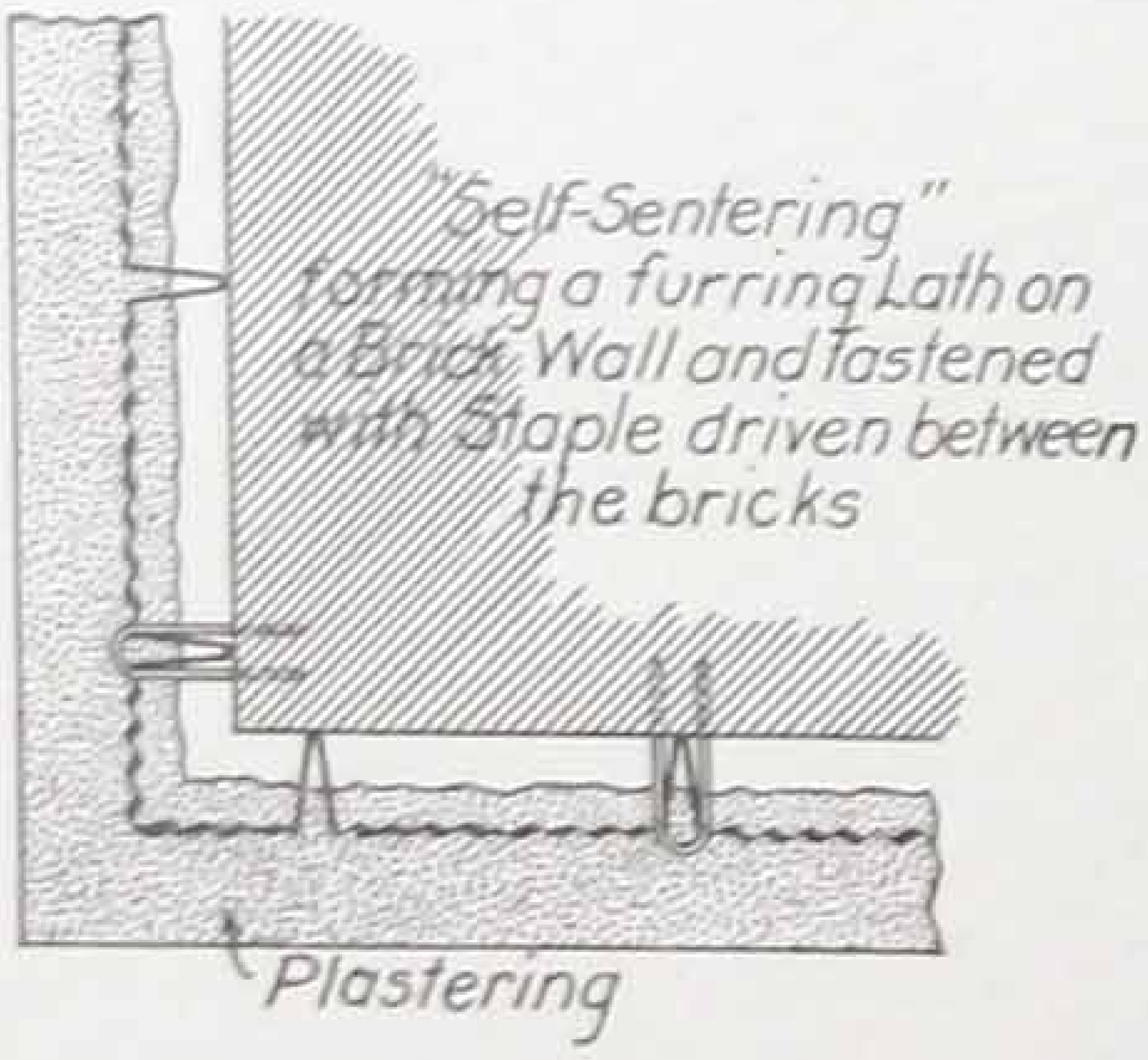
Self-Sentering is applied with the heavy ribs against the wall, the diamond mesh connecting fabric or lath acting as the plastering surface. This acts as an economical plastering surface. After applying a heavy plaster coat there is still plenty of air space between it and the sheathing which acts as an insulation and prevents rapid absorption of moisture from the plaster by the wood.

The heavy, closely spaced ribs of Self-Sentering make it unusually firm under the trowel whether over sheathing or widely spaced studs. The plaster which is easily applied to a uniform thickness is free from the common danger of cracking.

Self-Sentering possesses ample strength to carry the extra heavy coating of cement plaster needed for the best results with stucco.

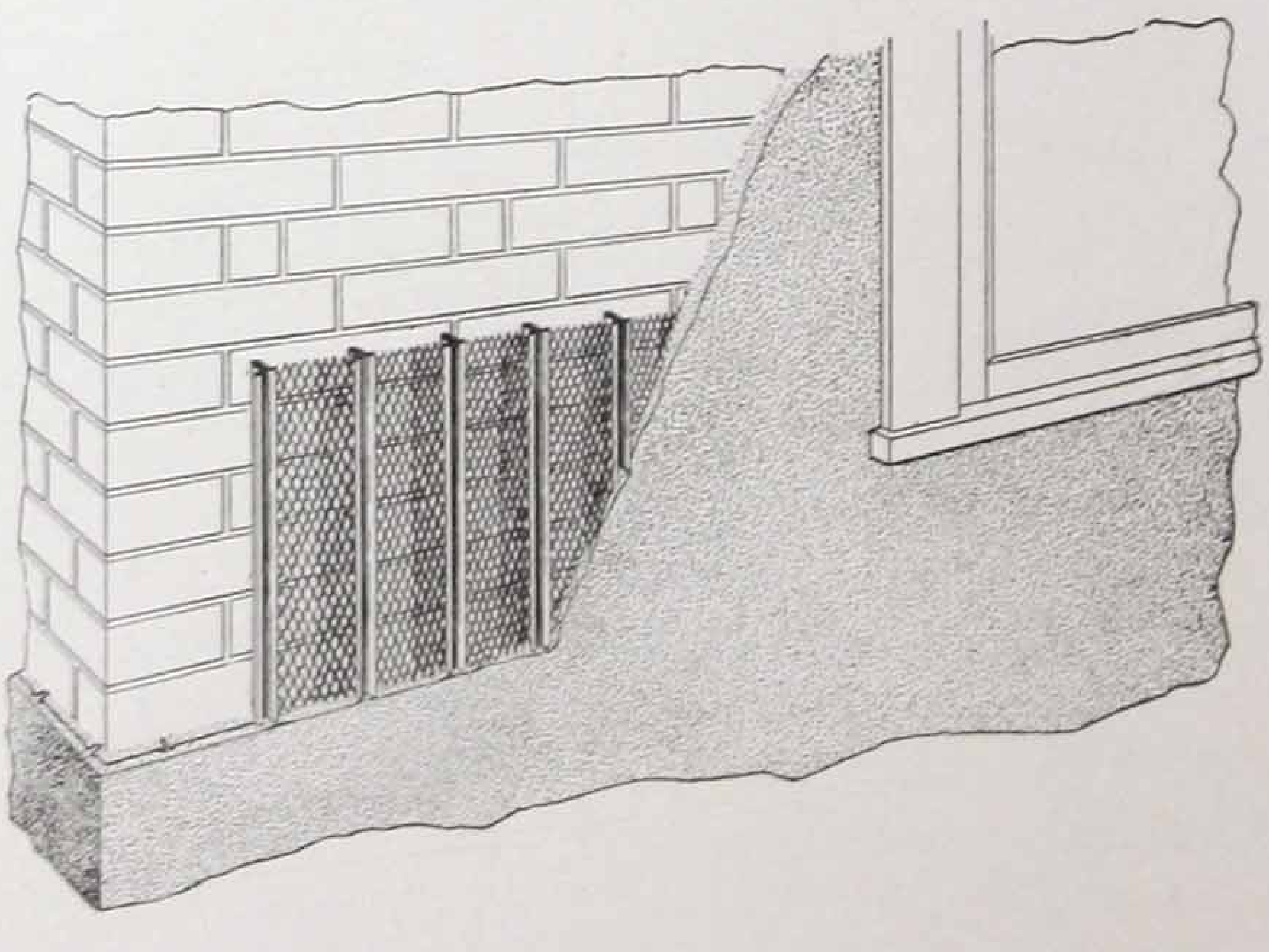


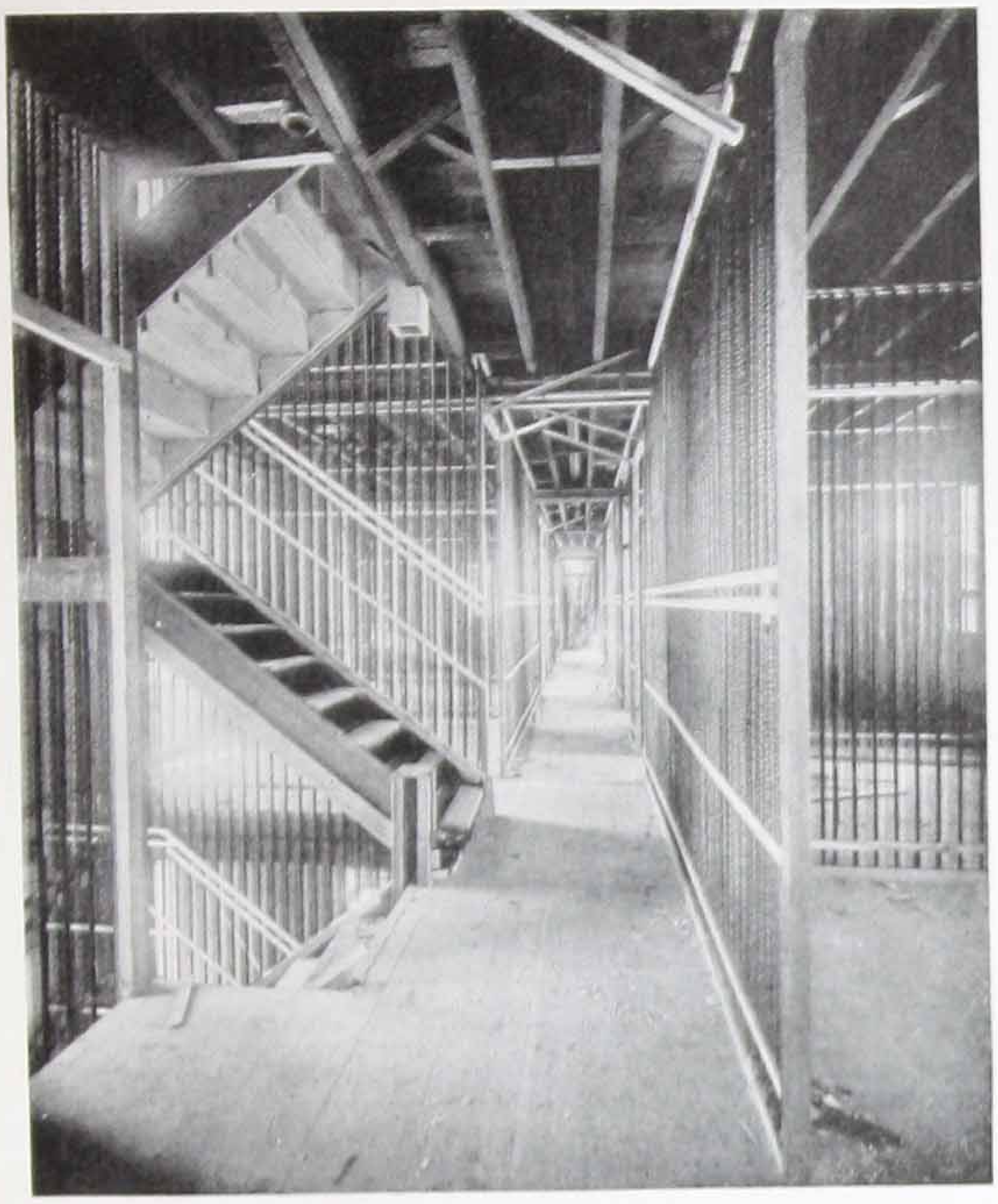
Method of using Self-Sentering for stucco exterior over wood studding. Ribs run across the studs giving great rigidity and furring the lath well out from the face of studs



"Self-Sentering" forming a furring Lath on a Brick Wall and fastened with Staple driven between the bricks
Plastering

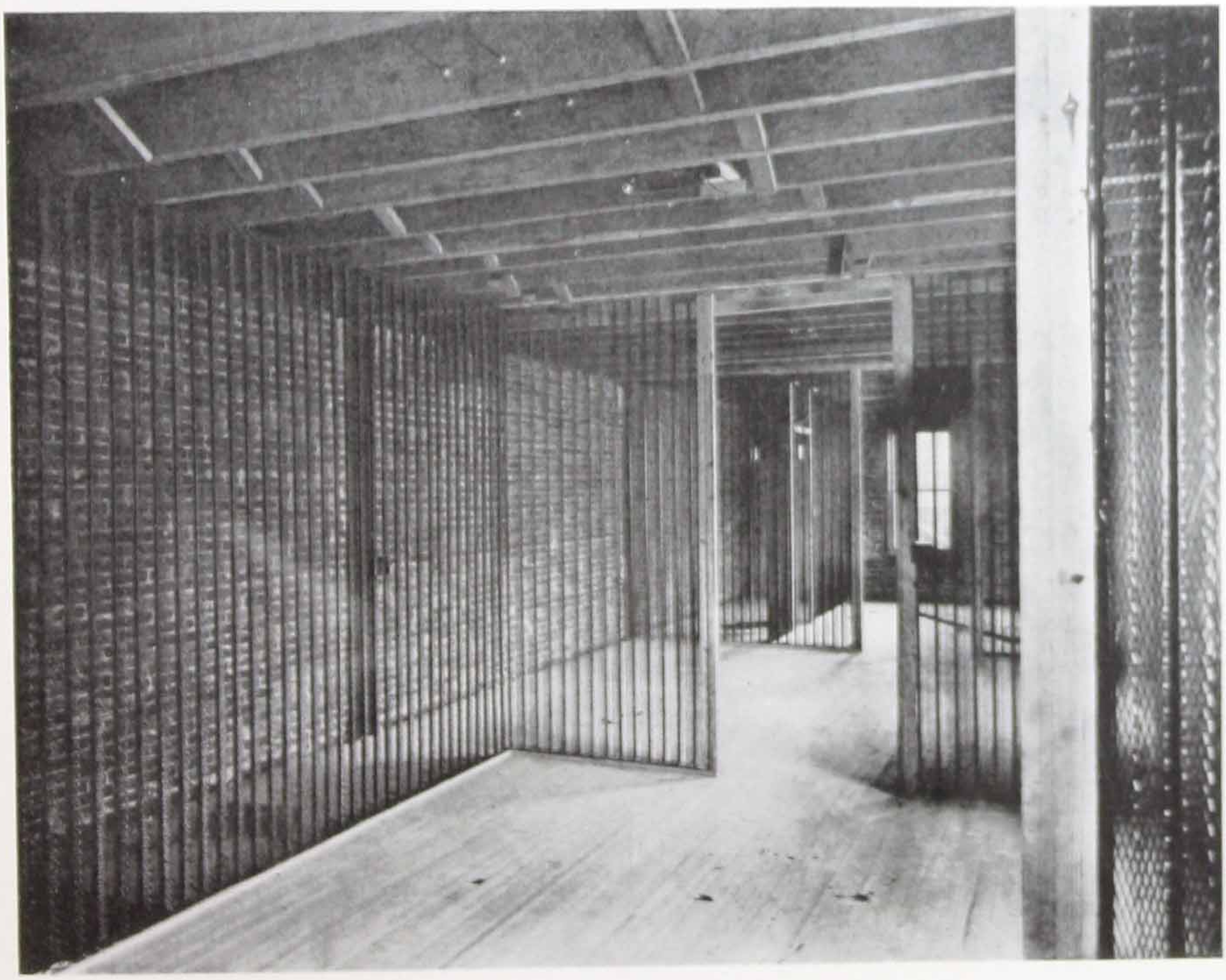
This method applies to good advantage both inside and outside of brick, tile or masonry walls and over sheathing for stucco exteriors





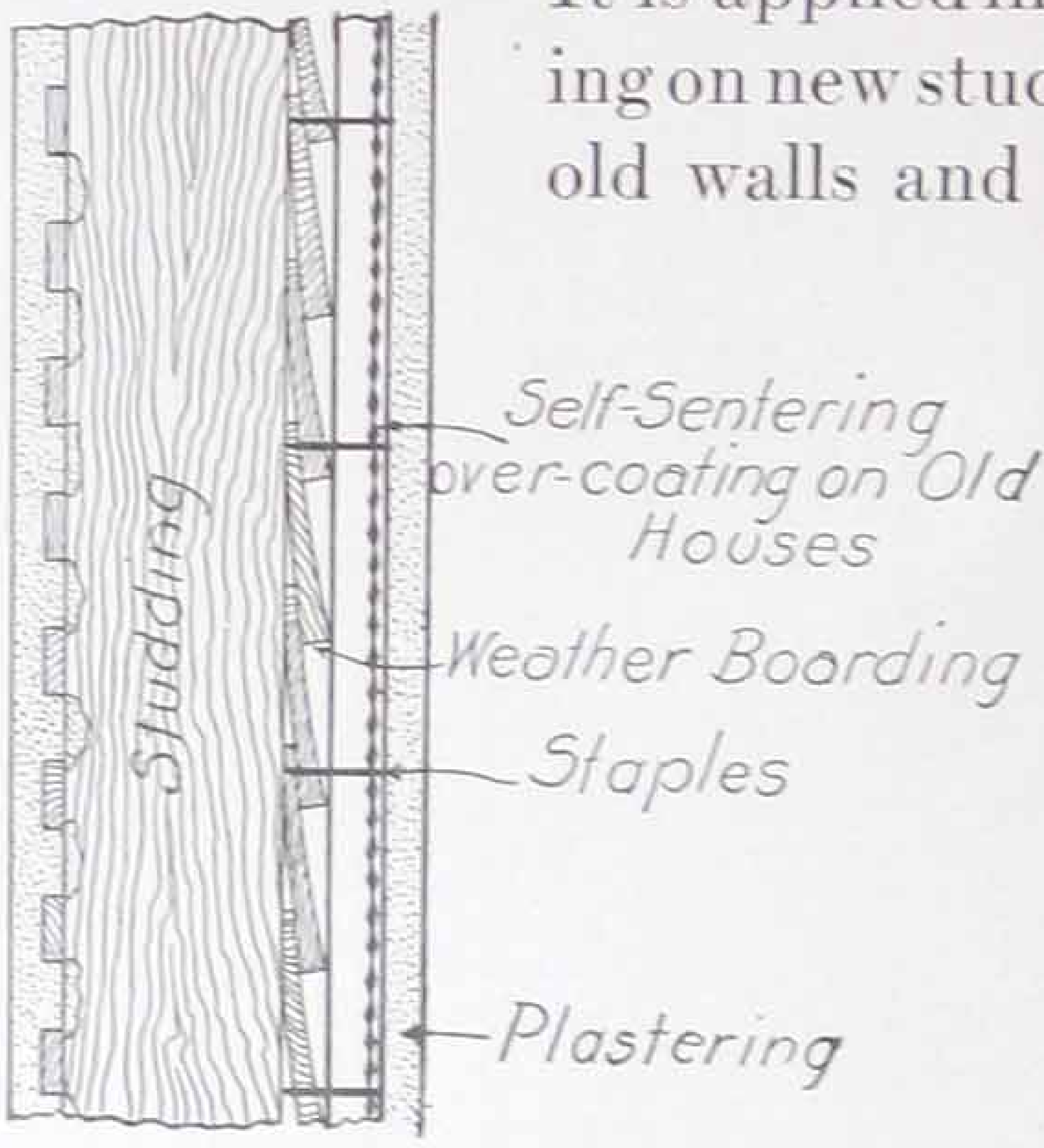
Five - Story Apartment,
San Francisco, Cal.
Solid partitions of
Self-Sentering
Architect—W. S. Rhodes
Contractor—J. B. Dennis

Bower's Sanitarium, Lancaster, Pa. Self-Sentering
Partitions in Wood
Floor Building
Arch., H. M. Bartholemew
Cont., L. V. Wright



Overcoating Houses

The remodeling of old frame houses, transforming them into modern stucco residences, is readily accomplished by the use of Self-Sentering. It is applied in the same manner as when used over sheathing on new stucco work, ribbed side being placed against the old walls and securely fastened by staples. Old trim is either removed and plastered corners substituted, or is blocked out to correspond with the increased thickness of the wall.



Cement plaster should be applied to Self-Sentering to a thickness of at least 1 inch, preferably more.

The value of a residence thus remodeled, at a very low cost, will be greatly increased and the rejuvenated building will present a very attractive appearance, as the lines of the old-fashioned frame houses lend themselves very readily to this type of construction.

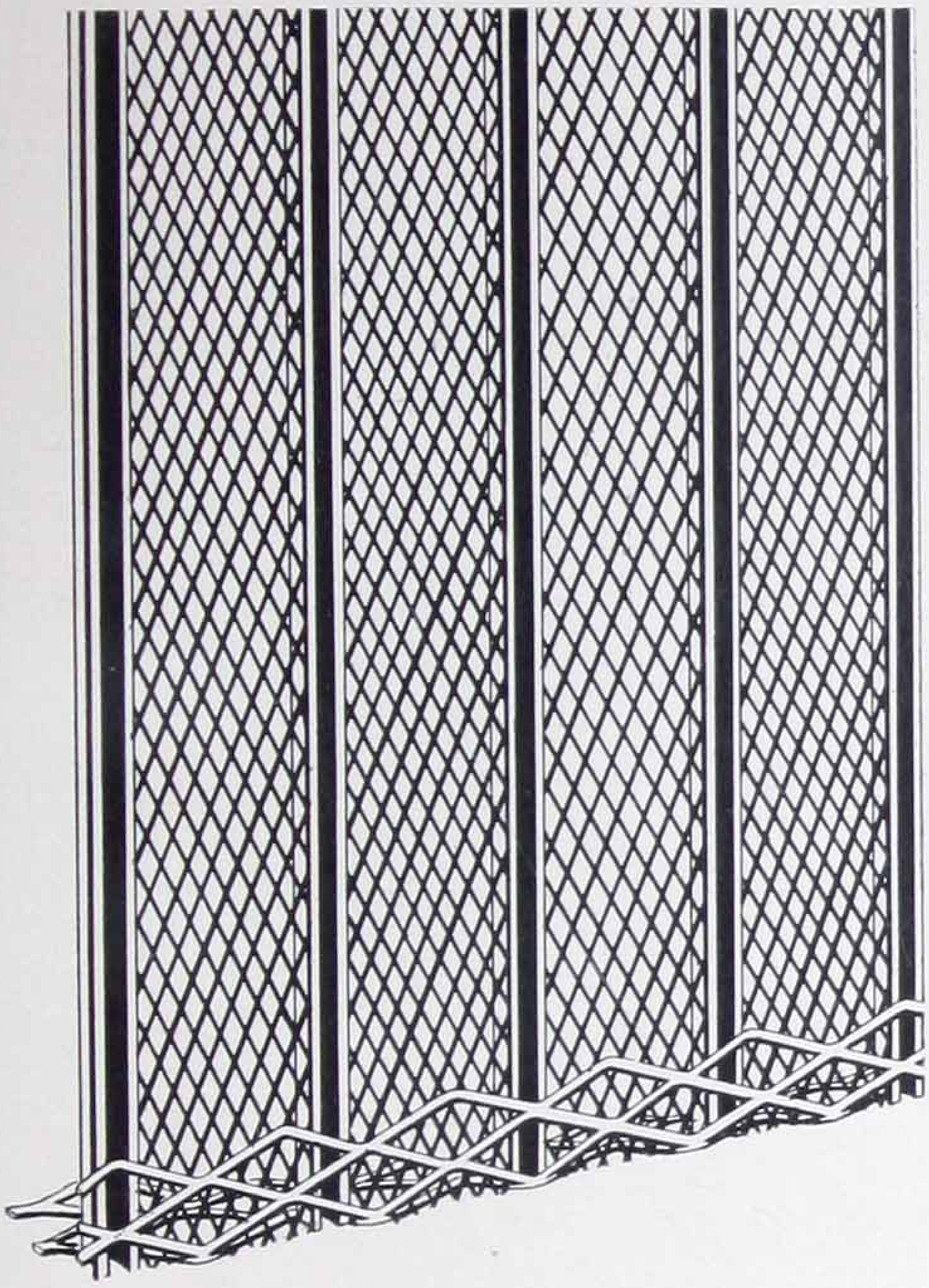
Self-Sentering in Wood Frame Buildings

The use of fire-resisting concrete in connection with wood frame buildings is an economy well worth obtaining on all building operations of that kind whether large or small. Self-Sentering and cement for walls, floors, roofs and ceilings act as an effective fire stop, checking most fires before they get to the wood structure. In every case this construction prolongs the life of a wood frame building by protecting it from moisture, wood-boring worms and decay.

This economical type of construction is adaptable to practically any structure. Factories, storerooms, apartments, houses, hospitals, stores, offices, etc., are all rendered more safe from fire and more lasting by its use.

Note the construction on page 81—brick walls, wood framing and floors, Self-Sentering partitions. These would be enough to confine an ordinary blaze to one room where with less substantial building it might quickly spread throughout the building.

Because of its stiff ribs Self-Sentering is quickly set in place and economically plastered. Its strength makes possible wide spacing of studs and the need of but few temporary supports and no permanent studs in solid partitions and curtain wall construction.



Expanded Metal Angle

For Attaching Self-Sentering to Floor or Ceiling

This offers the simplest and most efficient method of attaching Self-Sentering to floor and ceiling. The Expanded Metal Angle is made from No. 13 gauge steel and furnished in lengths up to 8 feet. The meshes are ¾ inch wide by 1½ inches long. The angle is merely laid along the line of the proposed partition, stapled to the floor every three feet and the Self-Sentering wired securely to the other leg of the angle. This angle offers no obstruction to the plaster; it is merely imbedded in it and becomes an integral part of the partition, making the fastening absolutely permanent.

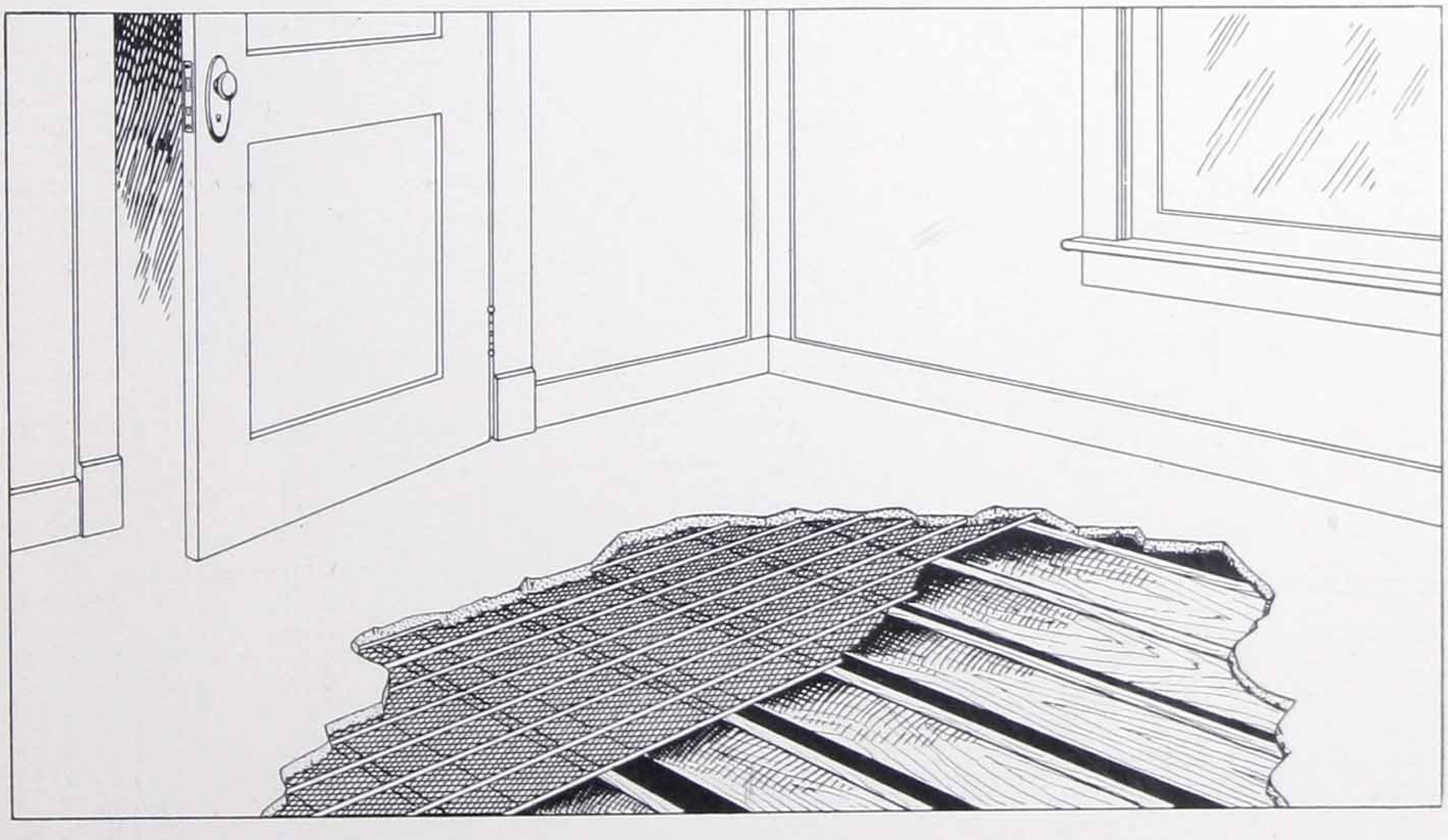
Self-Sentering Floors

Self-Sentering is stapled directly to floor or roof joists, rib side up and the concrete poured. Any desired floor finish can be laid above the concrete by placing wood strips or sleepers for fastening to, in position before pouring.

GF No. 10 Integral Waterproofing Paste or GF No. 250 Waterproofing Mastic should be used for roof waterproofing.

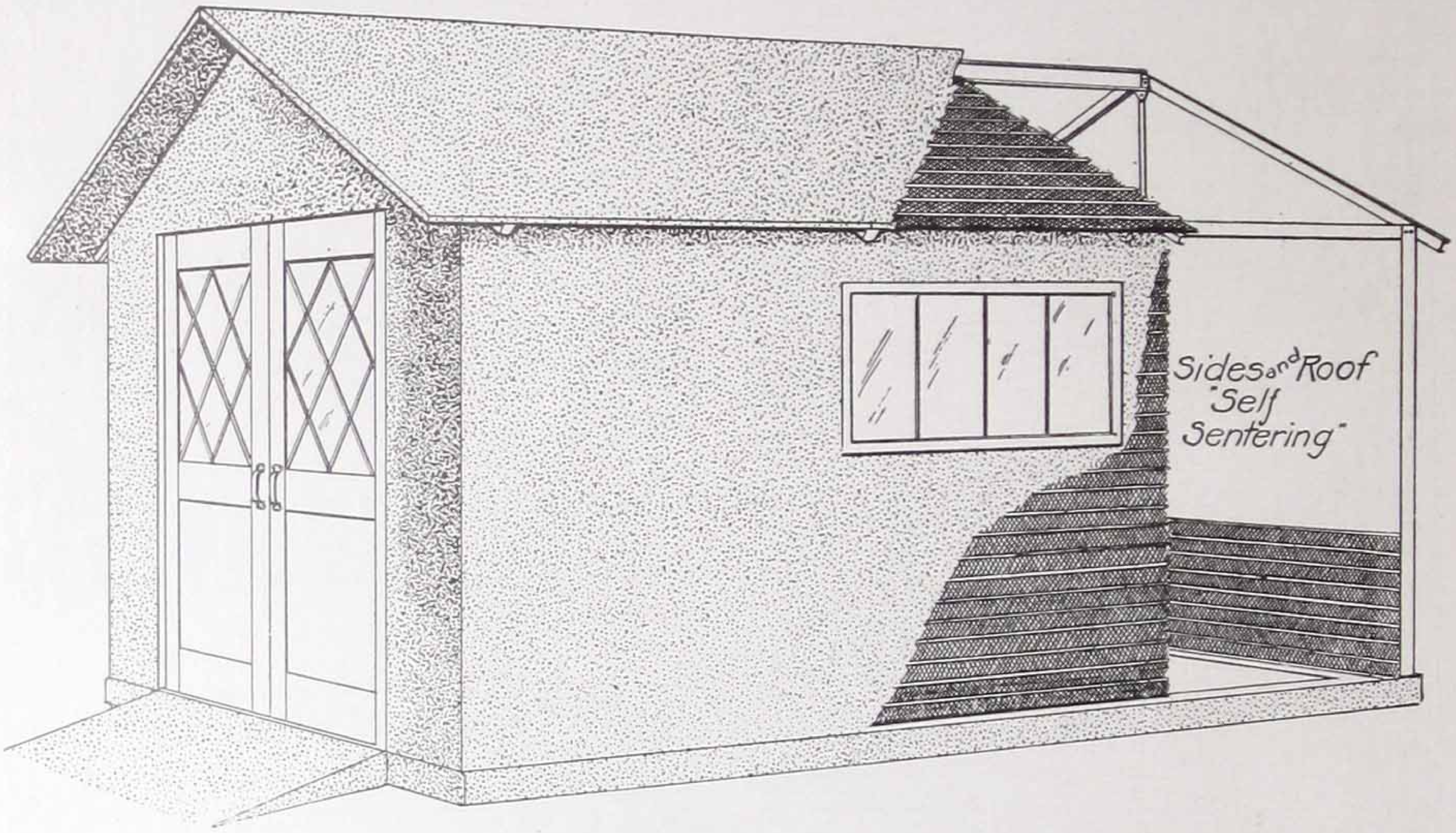
Notes—For floor and roof construction where heavy timbers are available, it is sometimes possible to effect a saving by spacing these heavier joists according to the tables for flat slab construction given on page 37.

In curtain walls and solid partitions, Trussit because of its uniform expansion is perhaps the best material obtainable. See details pages 52-73.

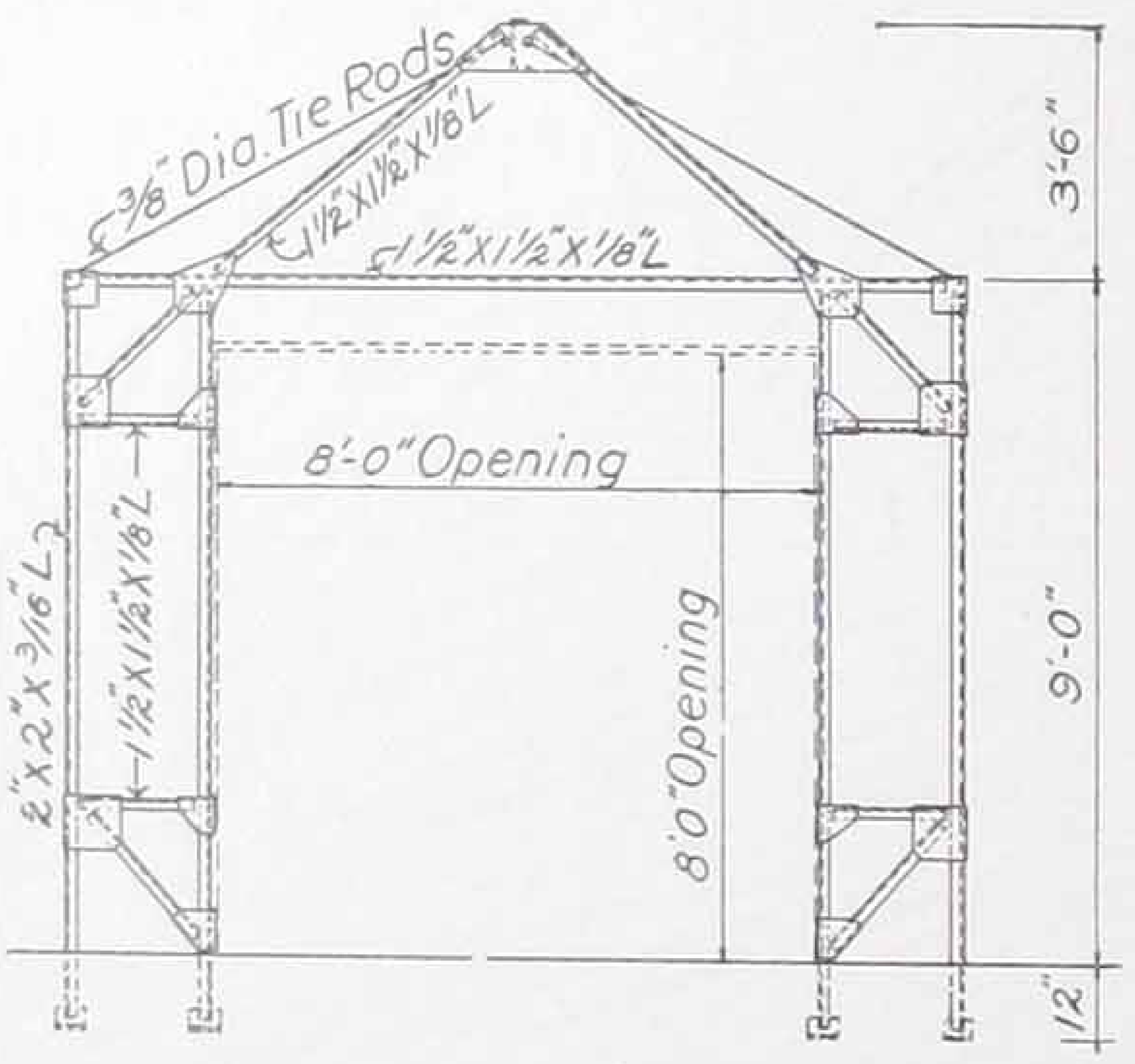


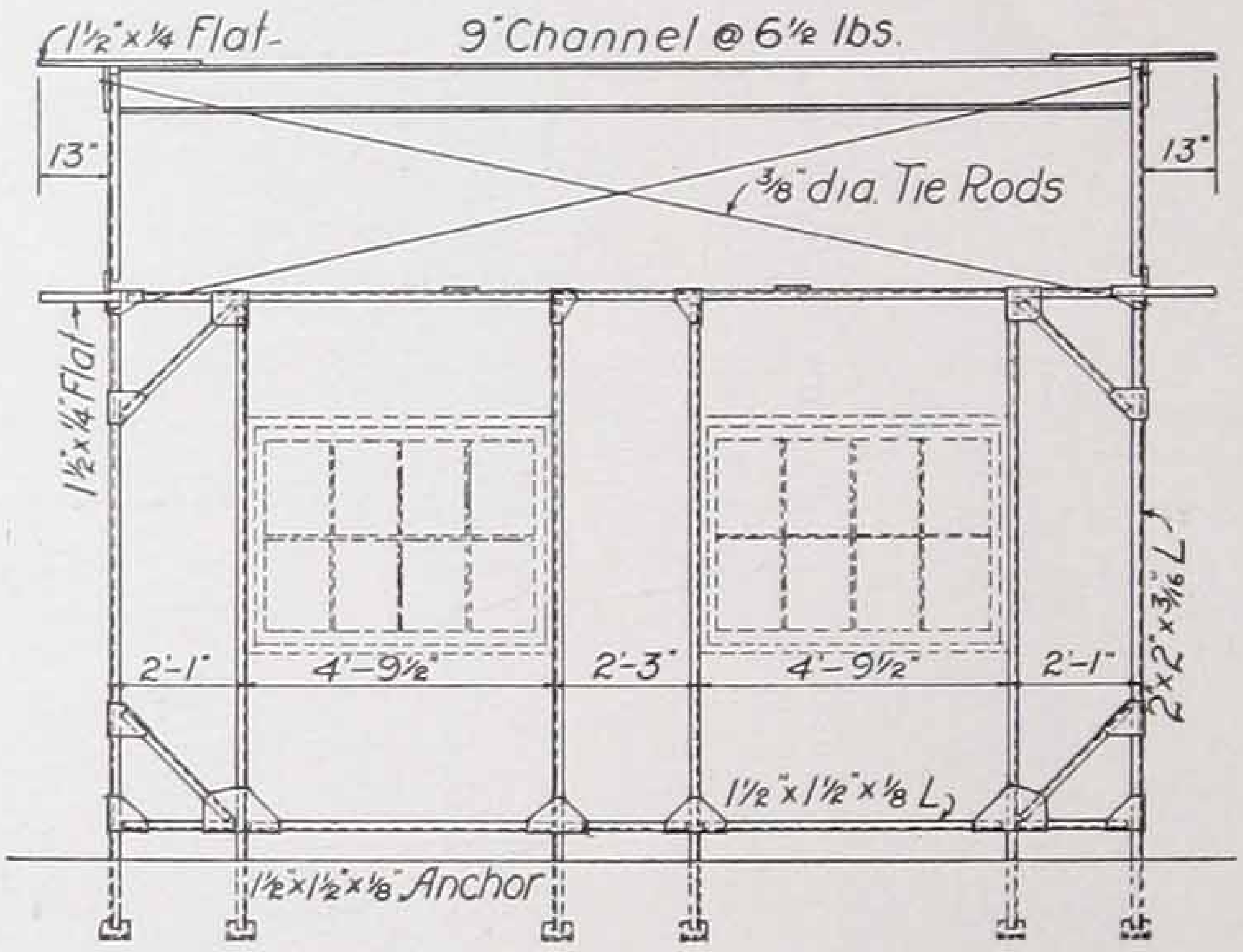
Detail of Self-Sentering Floor Over Wood Joist—Semi-fireproof Construction

Self-Sentering Garages

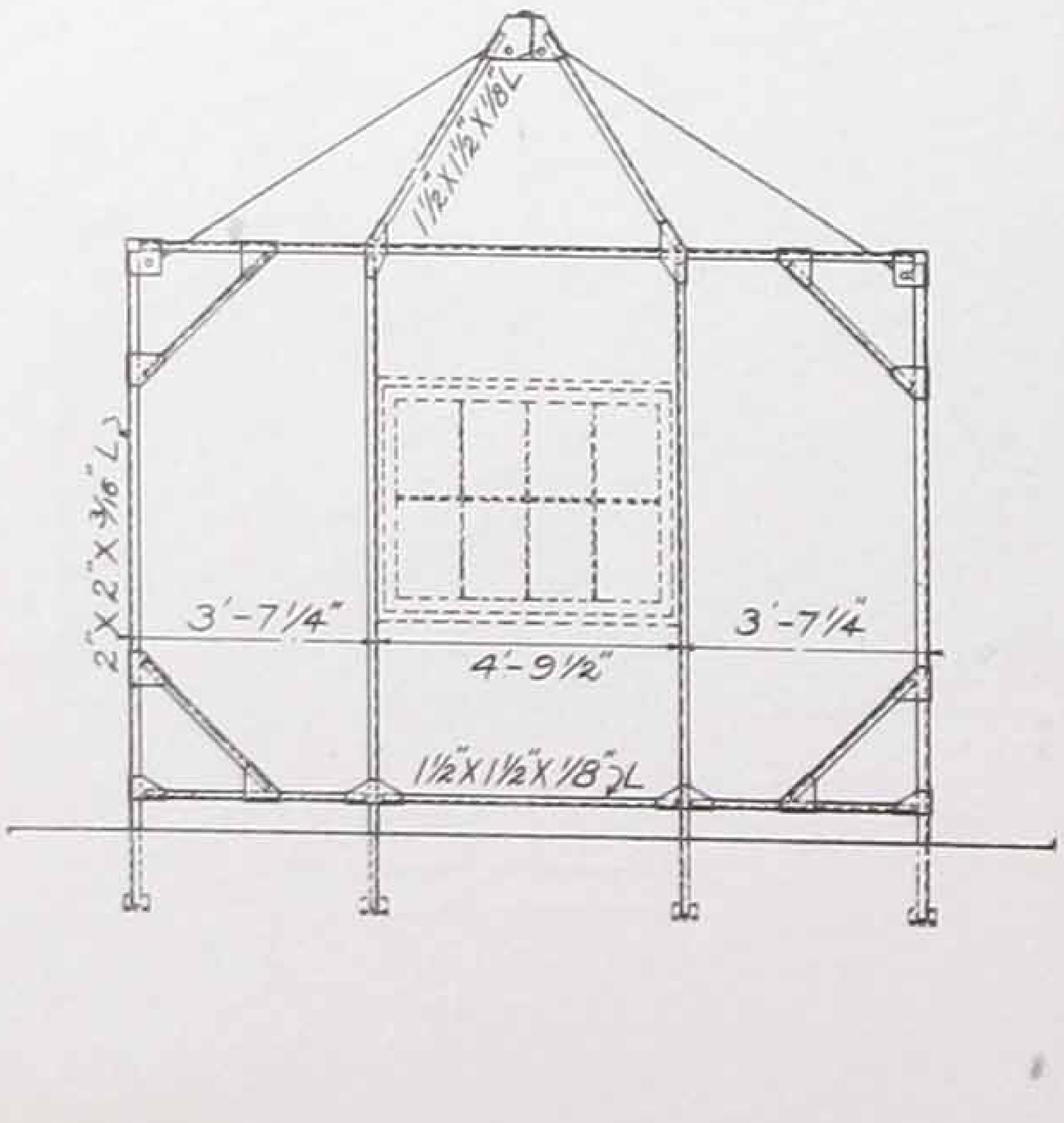


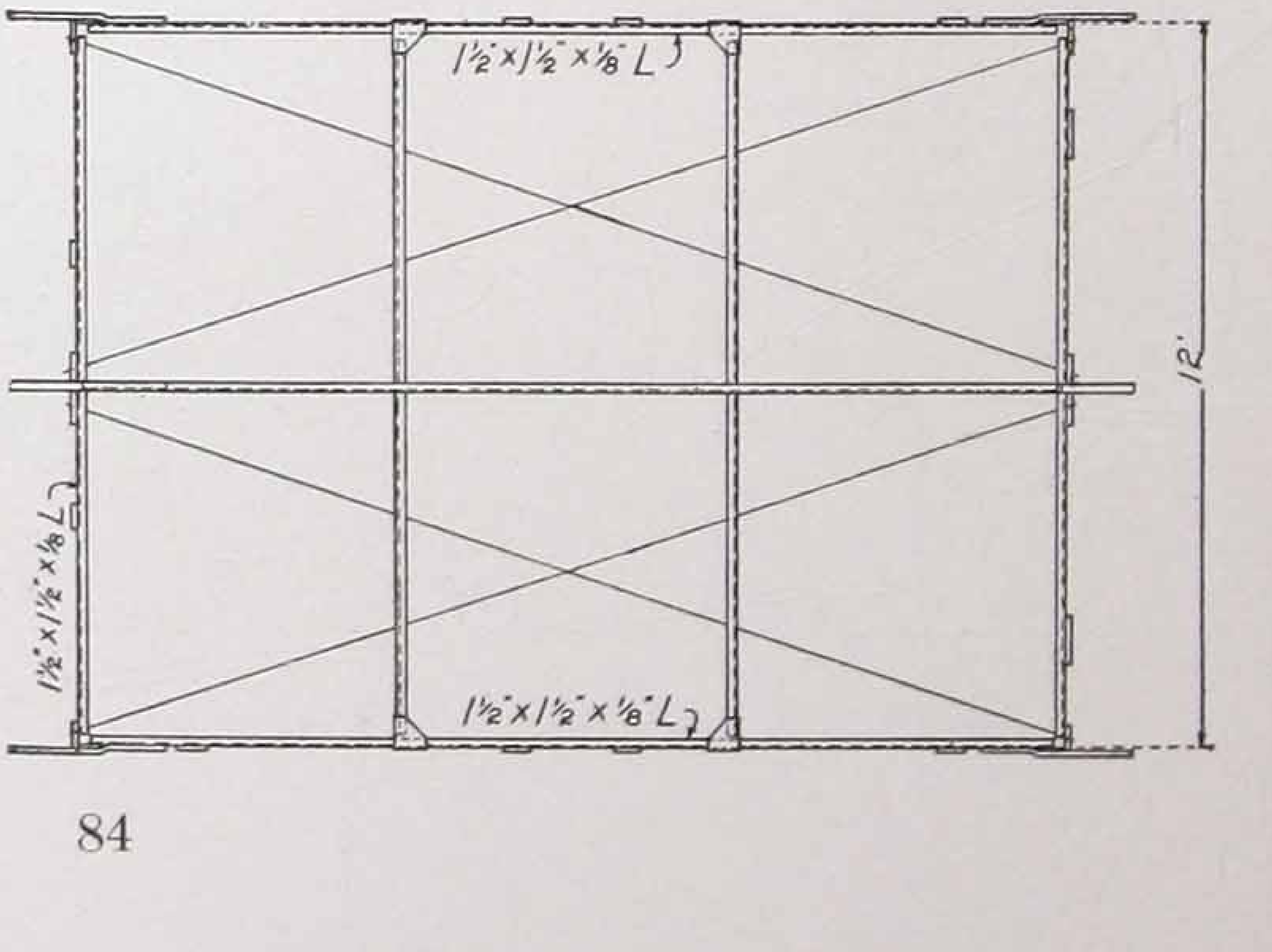
A solution for the problems of fire-resistance, cost, maintenance and appearance. Constructed on a light steel frame covered with Self-Sentering. Both walls and roof plastered to thickness of 2″ to 2½″.



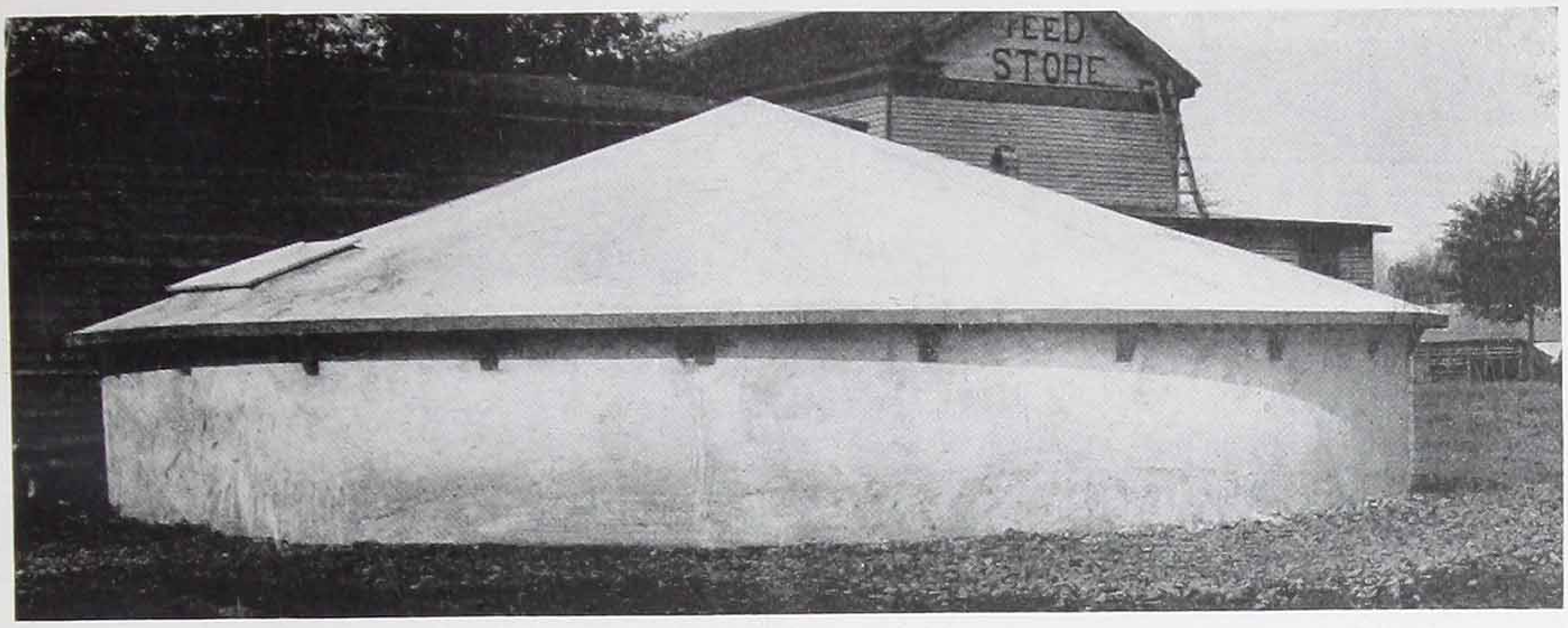


Details of Self-Sentering Garage Construction



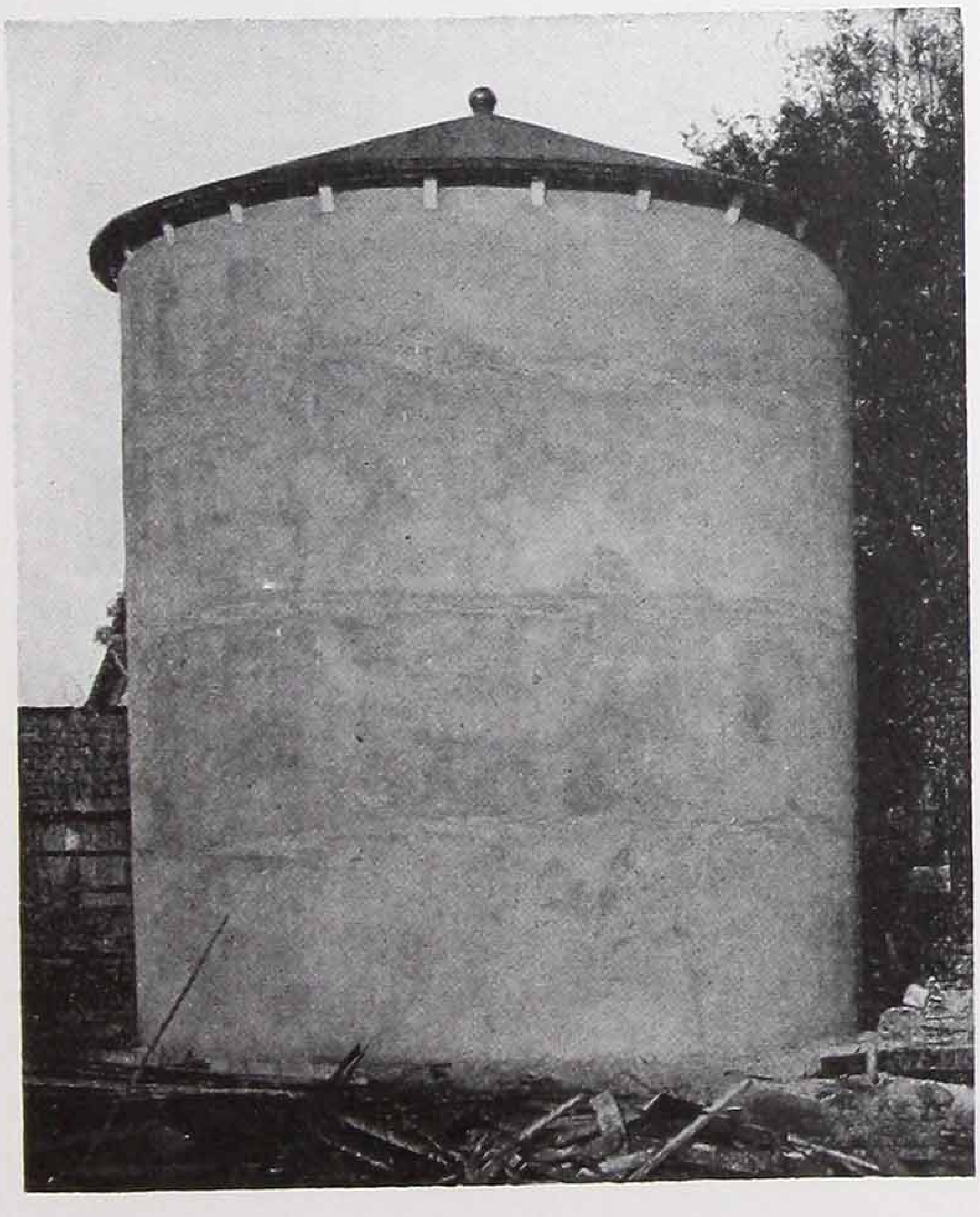


Self-Sentering Tanks

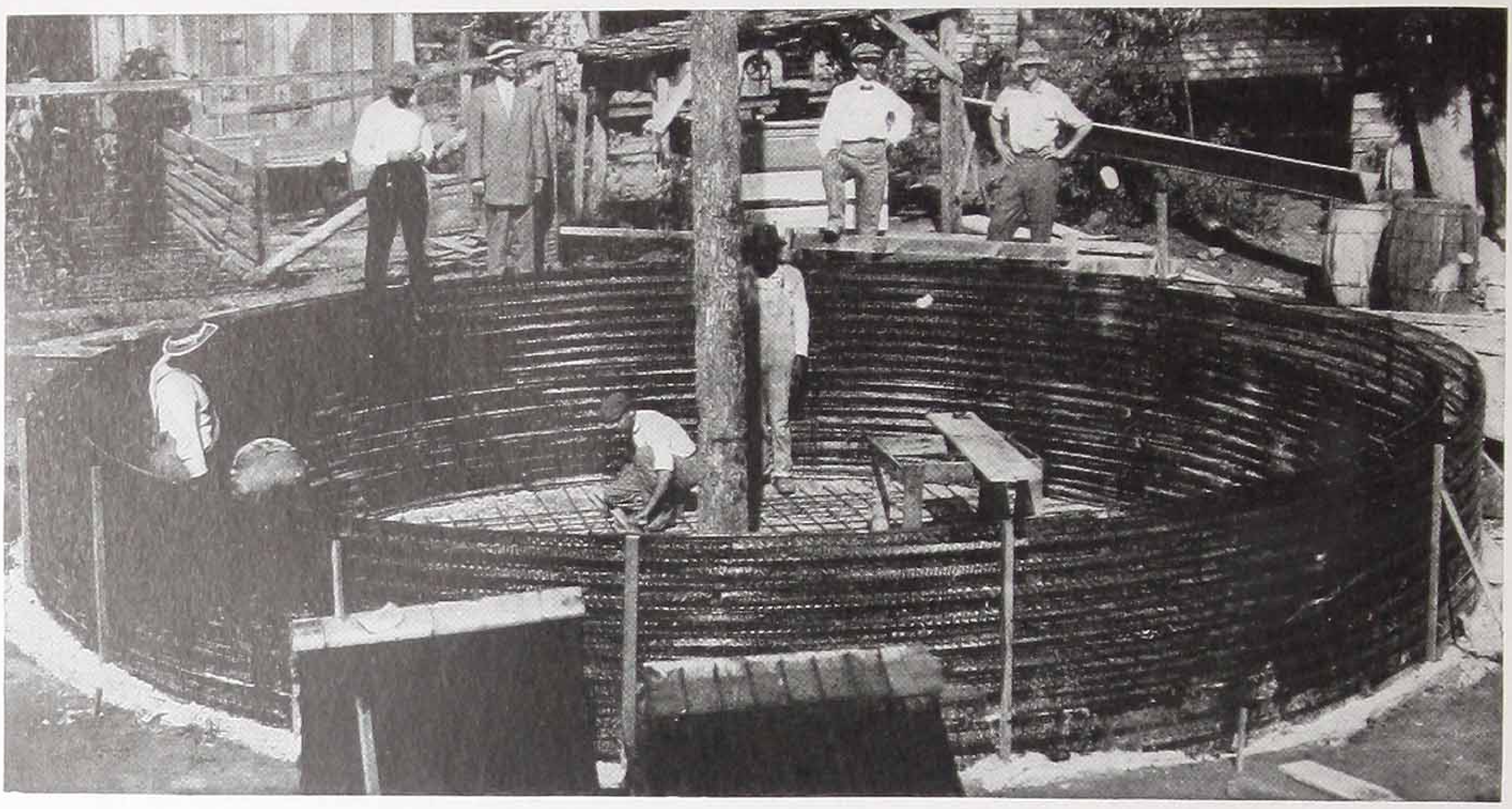


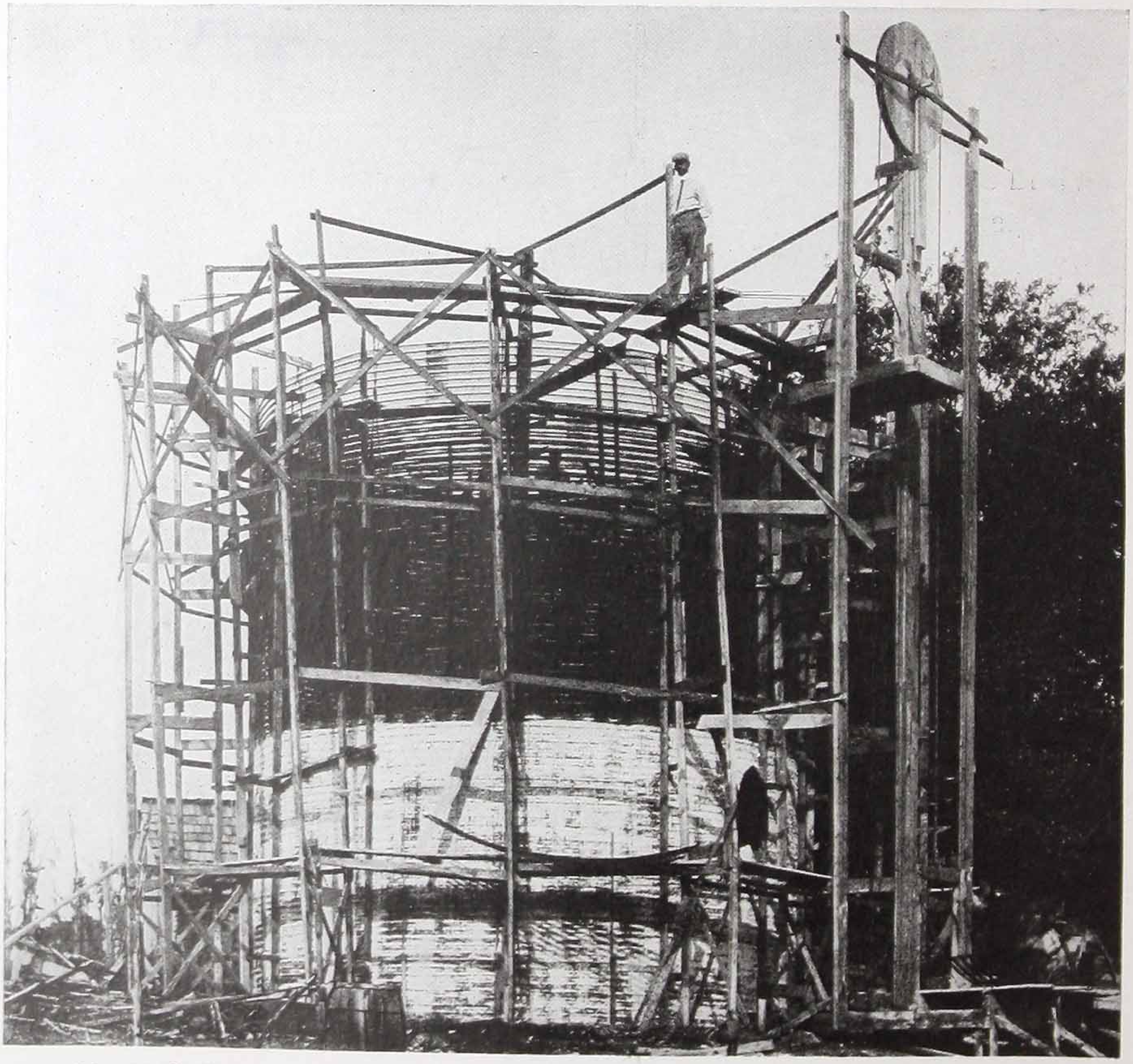
For water tanks of almost any size, Self-Sentering provides a means of reducing the cost and simplifying the construction.

For large tanks similar to those shown here, a double wall of Self-Sentering, curved at our factory to the desired radius, is used. The sheets are set on edge with side ribs interlocking and secured by punching, and end laps similarly fastened. The sheets can be so exactly curved that when two completed walls are in place the space between will be of uniform thickness without the necessity of spacers. The tank is then plastered inside and out with cement mortar and when this has attained its initial set, concrete is poured into the space between the two walls, making a solid wall. It has been found that Self-Sentering so used is cheaper than the wood forms which would otherwise be required, even if its reinforcing value is not considered.

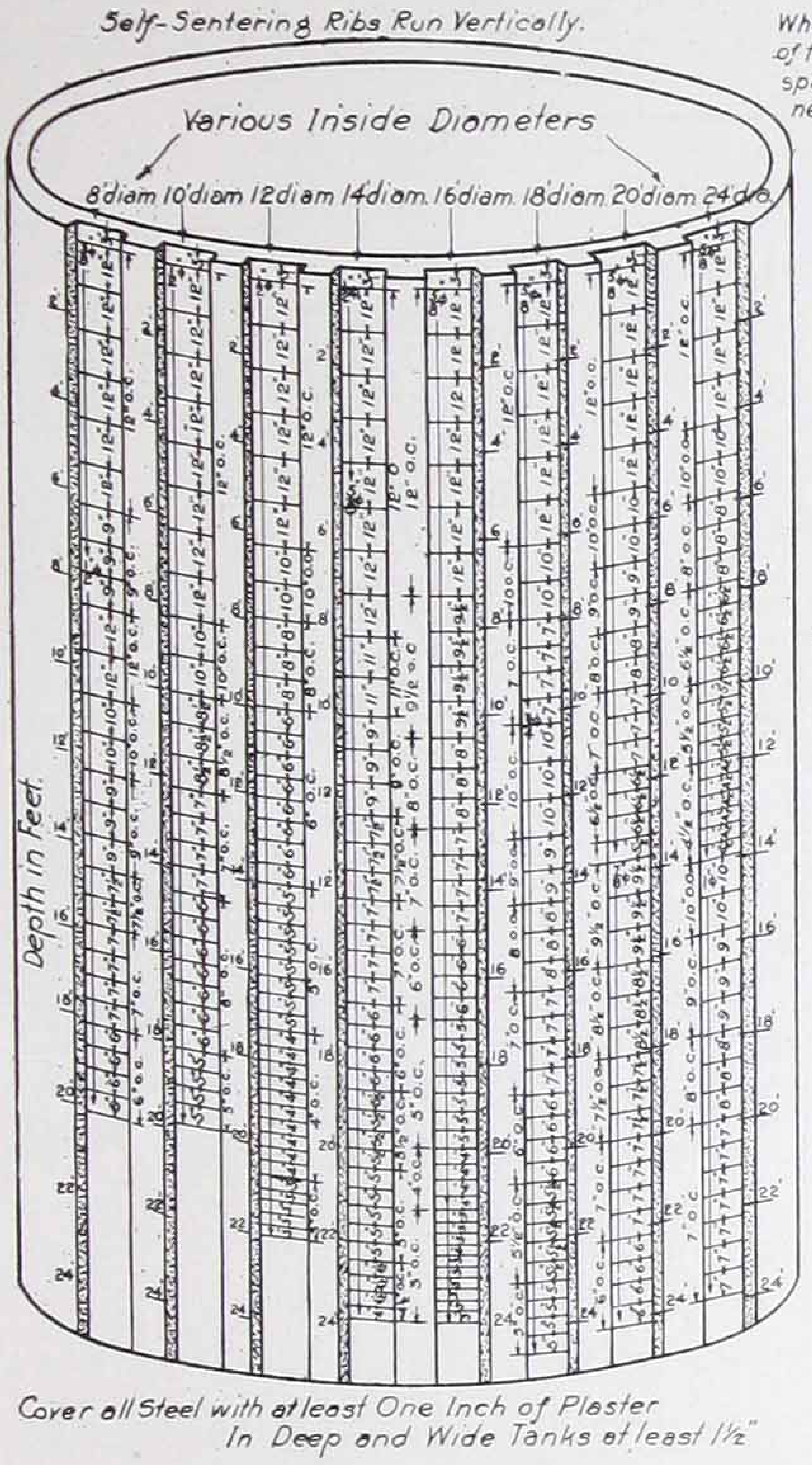


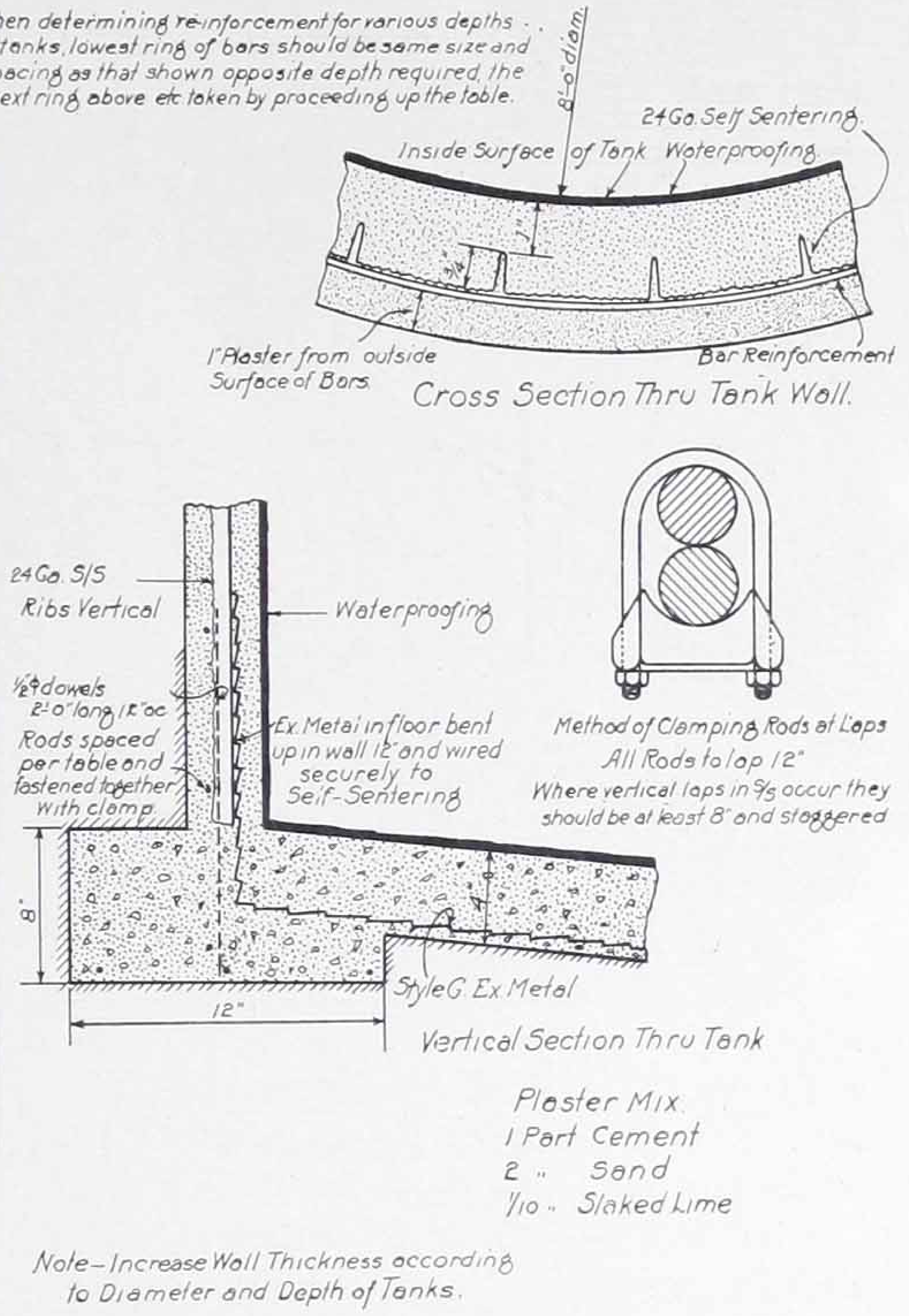
For small tanks, the single wall may be used, merely plastering the Self-Sentering on both sides with cement plaster and using some suitable waterproofing. (See "Waterproofing Handbook".)





80,000 Gallon Water Tank in Course of Construction at Fayette, Alabama Self-Sentering Used for Walls. Engineer, E. B. Kay, Tuscaloosa, Ala. Builder, W. W. Moore, Birmingham


Self-Sentering Ribs Run Vertically.
Various Inside Diameters
8'diam 10'diam 12'diam 14'diam 16'diam 18'diam 20'diam 24'dia
Depth in Feet.
Cover all Steel with at least One Inch of Plaster
In Deep and Wide Tanks at least 1½"


When determining re-inforcement for various depths of tanks, lowest ring of bars should be same size and spacing as that shown opposite depth required, the next ring above etc. taken by proceeding up the table.
8'-0" diam
24 Ga. Self Sentering
Inside Surface of Tank Waterproofing
1" Plaster from outside Surface of Bars
Bar Reinforcement
Cross Section Thru Tank Wall.
24 Ga. S/S Ribs Vertical
Waterproofing
½" ⌀ dowels 2'-0" long 12" oc
Rods spaced per table and fastened together with clamp
Ex. Metal in floor bent up in wall 12" and wired securely to Self-Sentering
8"
12"
Style G. Ex. Metal
Vertical Section Thru Tank
Method of Clamping Rods at Laps
All Rods to lap 12"
Where vertical laps in S/S occur they should be at least 8" and staggered
Plaster Mix
1 Part Cement
2 " Sand
1/10 " Slaked Lime
Note—Increase Wall Thickness according to Diameter and Depth of Tanks.

Another method of building Self-Sentering tanks is here shown. The Self-Sentering is run vertically, and round rods are placed at correct intervals, as shown in the sketch, to take care of bursting pressure.

This gives a solid-wall tank of almost any desired capacity—only one layer of Self-Sentering is used and this plastered on both sides to the required thickness. No forms are required.

The variation in size of tanks and corresponding differences in stresses are cared for by varying the spacing of the rods encircling the tank.

Self-Sentering Silos

In the construction of farm buildings, the tendency to build for permanence and for fire protection is increasing rapidly. The concrete building is coming to be recognized by the progressive farmer as the most desirable from every standpoint.

One of the most important of his buildings, particularly if he is a stock raiser, is the silo. The expense of curved form work, however, has always been more or less of a bugbear when considering a concrete silo. By the use of Self-Sentering this objection is removed. A temporary framework, of 2 x 4 inch studs spaced about 30 inches on centers, is erected and Self-Sentering, curved in our factory to the exact radius required, is erected outside and then plastered on both sides with cement mortar of the same consistency as described in specifications for outside walls on page 67.

Rods ⅜ inch diameter and spaced 36 inches on centers are run from foundation to top and securely wired to the Self-Sentering. When one coat of plaster has been applied outside and inside the temporary 2x4 inch supports may be removed. Plaster coats are applied to both sides until the total thickness of 3 inches is reached. It is good practice to increase this to 4 inches around door openings.

GF No. 10 Integral Waterproofing Paste should be used in the finish coat on both sides.

A double wall Self-Sentering Silo is constructed by finishing up a single wall silo as described above, attaching **GF Cold Rolled Steel** Channels spaced with plates to leave an air space uniformly 4 inches wide, and erecting and plastering an outer shell of Self-Sentering. The air space is filled with an insulating material in severe climates. The cost runs from 25 per cent to 35 per cent greater than the single wall silo.

Such silos as here shown cost but little more than the old wood structures but they cannot be burned or blown down, never require repairs and are practically everlasting.

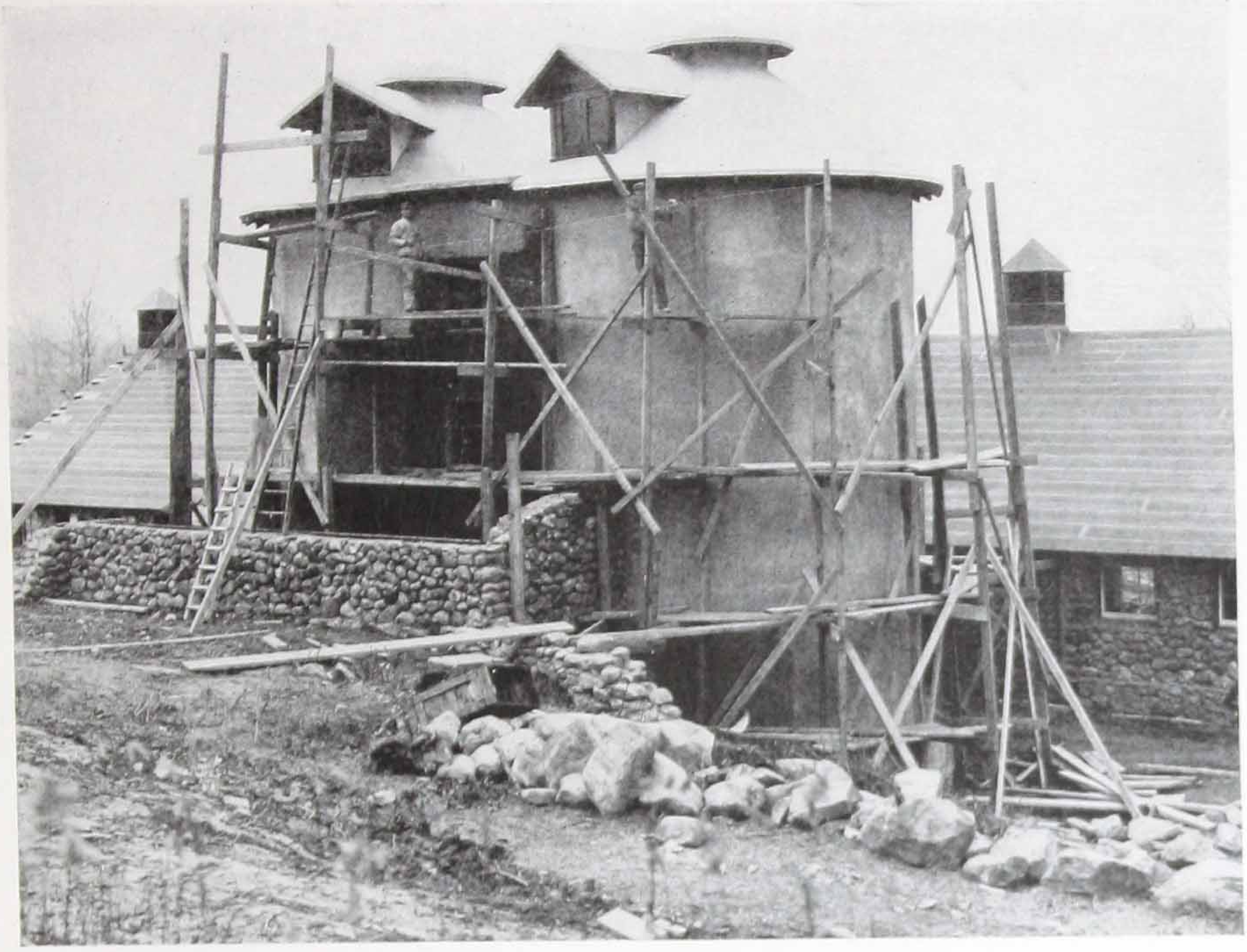
A very complete book, "Silos and Farm Buildings of Steel and Concrete," giving full details for silo construction will be sent to any one interested, on request.

Dimensions of Silo According to Size of Herd

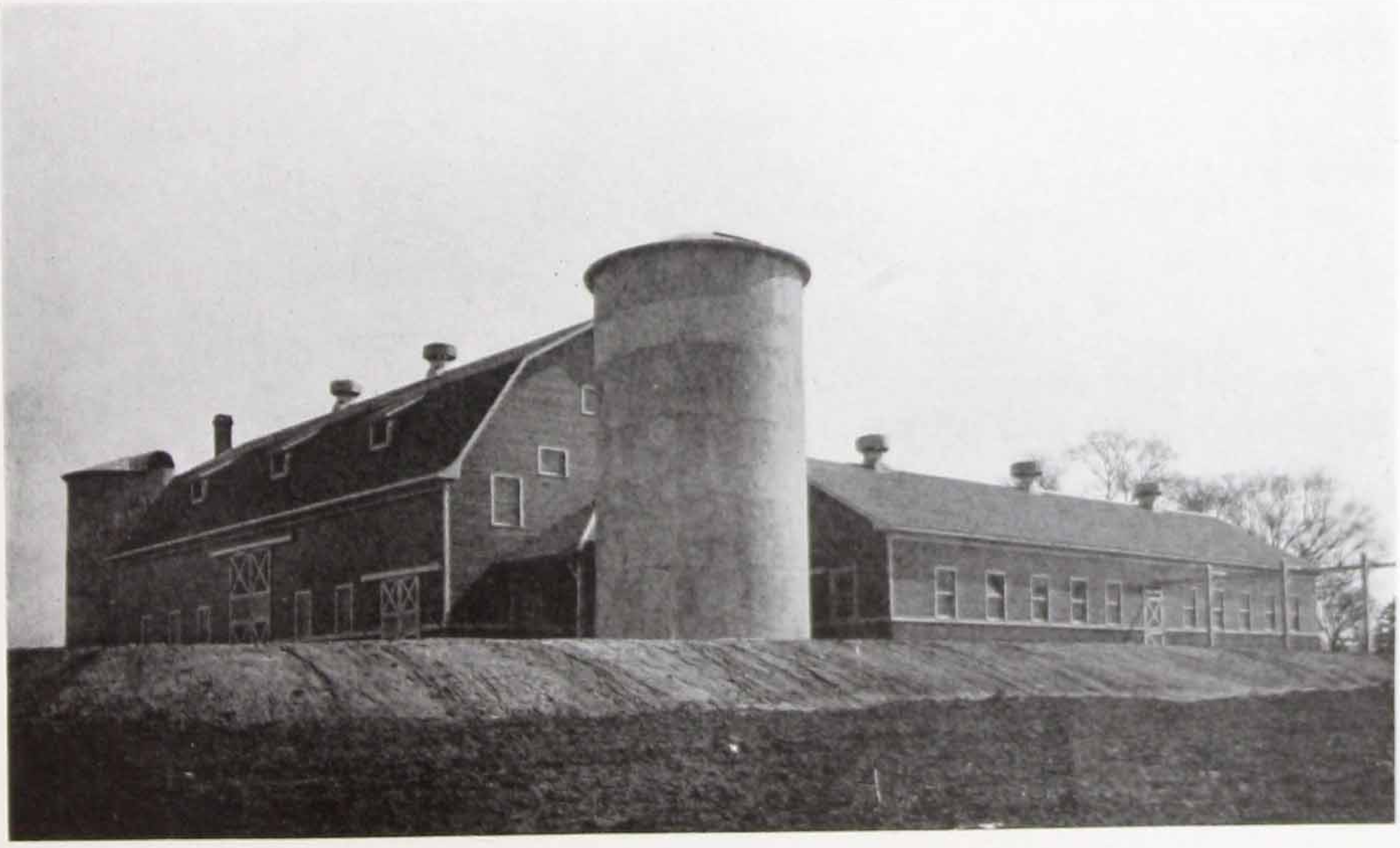
(Courtesy of American Association of Portland Cement Manufacturers)

No. of Cows in Herd	Feed For 180 Days				Feed For 240 Days			
	Estimated Tonnage of Silage Consumed	Size of Silo		Corn Acreage Required at 15 Tons to Acre	Estimated Tonnage of Silage Consumed	Size of Silo		Corn Acreage Required at 15 Tons to Acre
		Dia.	Height			Dia.	Height	
	Tons	Feet	Feet	Acres	Tons	Feet	Feet	Acres
10	36	10	25	2½	48	10	31	3½
12	43	10	28	3	57	10	35	4
15	54	11	29	4	72	11	36	5
20	72	12	32	5	96	12	39	6½
25	90	13	33	6	120	13	40	8
30	108	14	34	7½	144	15	37	10
35	126	15	34	8½	168	16	38	11
40	144	16	35	10	192	17	39	13
45	162	16	37	11	216	18	39	14½
50	180	17	37	12	240	19	39	16
60	216	18	39	14½	288	20	40	19
70	252	19	40	17	336			

This is based on 40 pounds of silage per day for each cow. Horses and mules take about half that amount and sheep about one-third.

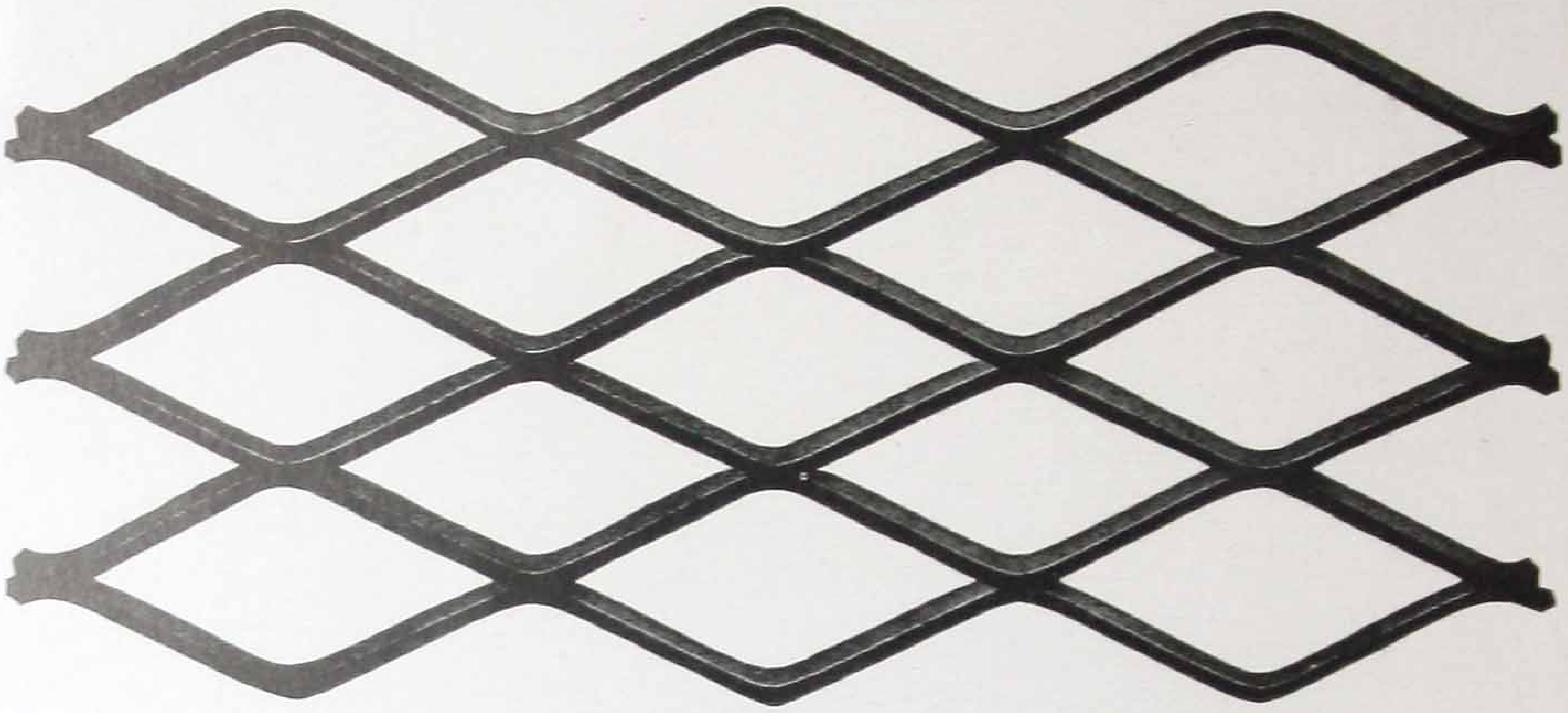


Twin Silos Erected with Double Self-Sentering Walls, Mohegan Farm, Mohegan Lake, N. Y. Charles H. Baker, Proprietor



Self-Sentering Silos, State Insane Farm, Columbia, S. C. Architect, Geo. F. La Faye

Expanded Metal



EXPANDED Metal is a material produced by a machine which automatically opens into meshes of any desired size, a plain flat sheet of steel. The sheet goes into the machine cold and at a single operation is slit and expanded without a waste of material.

The meshes can be varied in size to suit the purpose which the metal will serve. The coarser meshes are used for concrete reinforcement in the construction of floors, roofs, sidewalks, bridges, sewers, conduits, tanks, reservoirs, retaining walls, etc. The smaller meshes find a great variety of uses such as for railings, window guards, machinery guards, elevator and tool room enclosures and many similar places.

Since the style of metal to be used for reinforcing is of greater importance the miscellaneous uses will not be described in detail here but if interested, special literature will be sent.

In reinforcing material for slab work, three essentials are constant. the effective sectional area of steel, the quality and the correct placing: Such material must also be low in cost and in this the actual cost of the material and the cost of placing, are considered.

A reinforcement that meets all these requirements with the least chance to go wrong is the nearest to ideal and Expanded Metal meets them all.

Since the width of the strand can be varied, the fabric can be made of almost any desired weight and sectional area. Thus, if the effective sectional area of the steel is specified, Expanded Metal can be furnished to suit the requirements.

The quality of the steel is assured because the very best grade of soft steel is demanded by the manufacturing process under which Expanded Metal is made. Inferior steel cannot be expanded.

Expanded Metal, from the very nature of the material itself, gives a most uniform distribution of the steel. However unskilled the workman, or however rapidly the work is being done, the fact that all that is necessary is to lay the sheets in place with ends and sides lapping one diamond, makes errors practically impossible. No care need be used in spacing reinforcement and no danger that pouring the concrete may displace the steel. The diamond shaped mesh gives continuity of reinforcement, diffusing stresses from concentrated loads over wide areas, eliminating the necessity for cross reinforcement and tending to transfer tensile stresses in steel to compression in concrete.

The sheets are of convenient size, and easily handled by one man. Large areas are covered at one time. The sheets are simply laid in the form and the job is ready for concrete. No wiring of bars or placing of spacers—all that is necessary is to insure that sheets are properly lapped. Thus the cost of placing is reduced to the minimum.

In laying out expanded metal reinforcement work, the long way of the diamonds should always run in the direction of the shortest span. The ends of sheets should be lapped one diamond (8 inches) and the sides, the width of one diamond (about 3 inches). This end lap is sufficient to develop the full strength of the steel and may occur at any point. The best place for it is at a point half way between the center of the span and the support, this being the point where stress changes from tension in steel to compression on concrete.

Expanded Metal should always be placed ¾ inch from the bottom of the slab and raised to 1 inch from the top over the supports. It is merely laid on the forms and after the concrete is poured, raised slightly with hooks to allow the concrete to flow underneath to the required depth, the aggregate preventing it from settling back onto the forms again.

The styles indicated by the table, page 92, can be shipped promptly. Other weights and sizes made on special order.

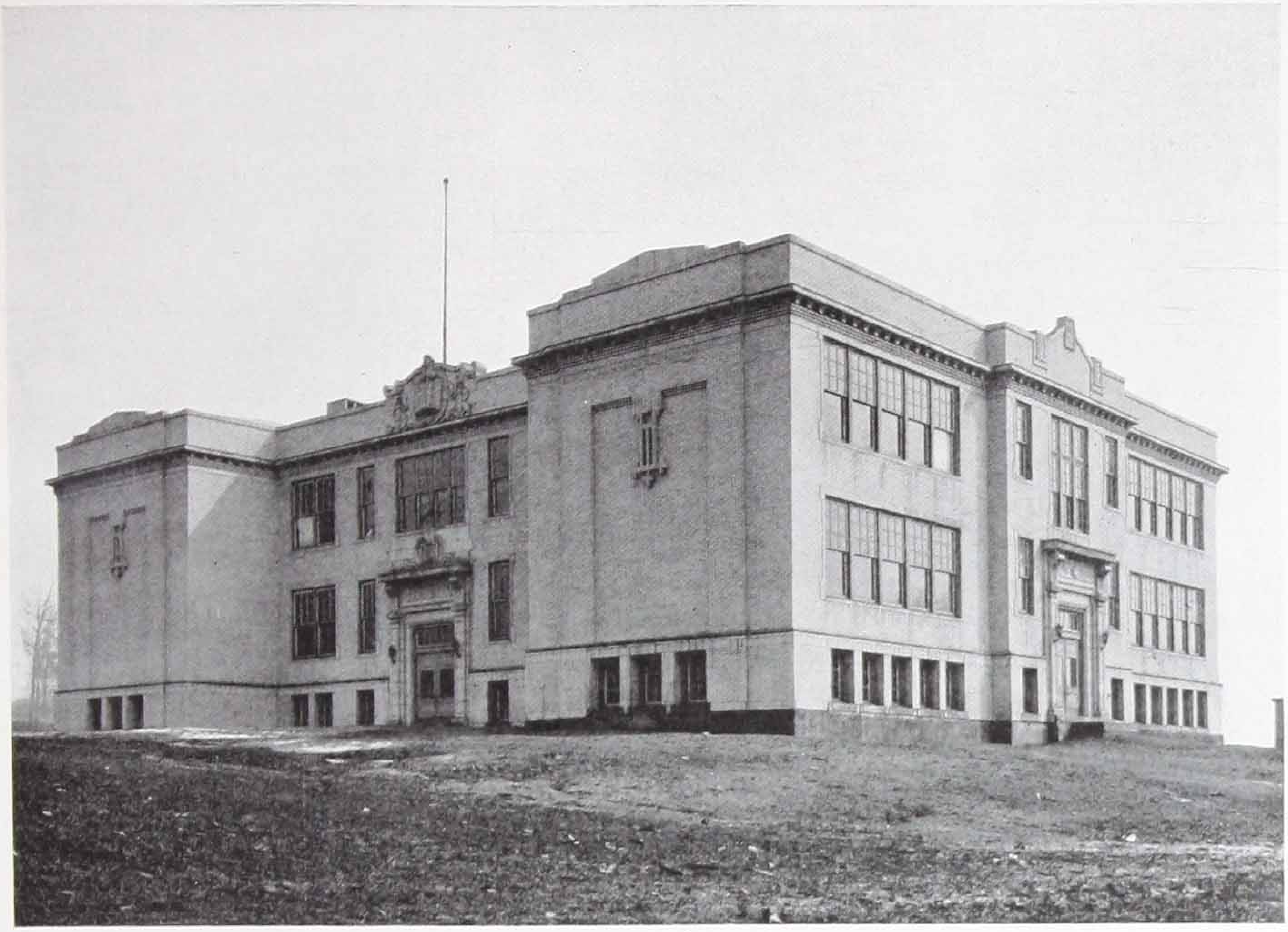
How to Order Expanded Metal

In ordering Expanded Metal, the following points should be taken into consideration: the effective sectional area and weight desired, the size of mesh (the dimensions of meshes are always referred to by the cross width), the length and width of sheets. The length of the sheet runs the long way of the diamond and unless otherwise specified, the first dimensions given will be taken as the length. Thus an order for sheets 10 feet by 5 feet would be filled with sheets 10 feet in length and 5 feet in width. With the exception of dimensions, these points are cared for by our style numbers, but in case none of the styles meet requirements the information above asked for will be sufficient to furnish what is wanted.

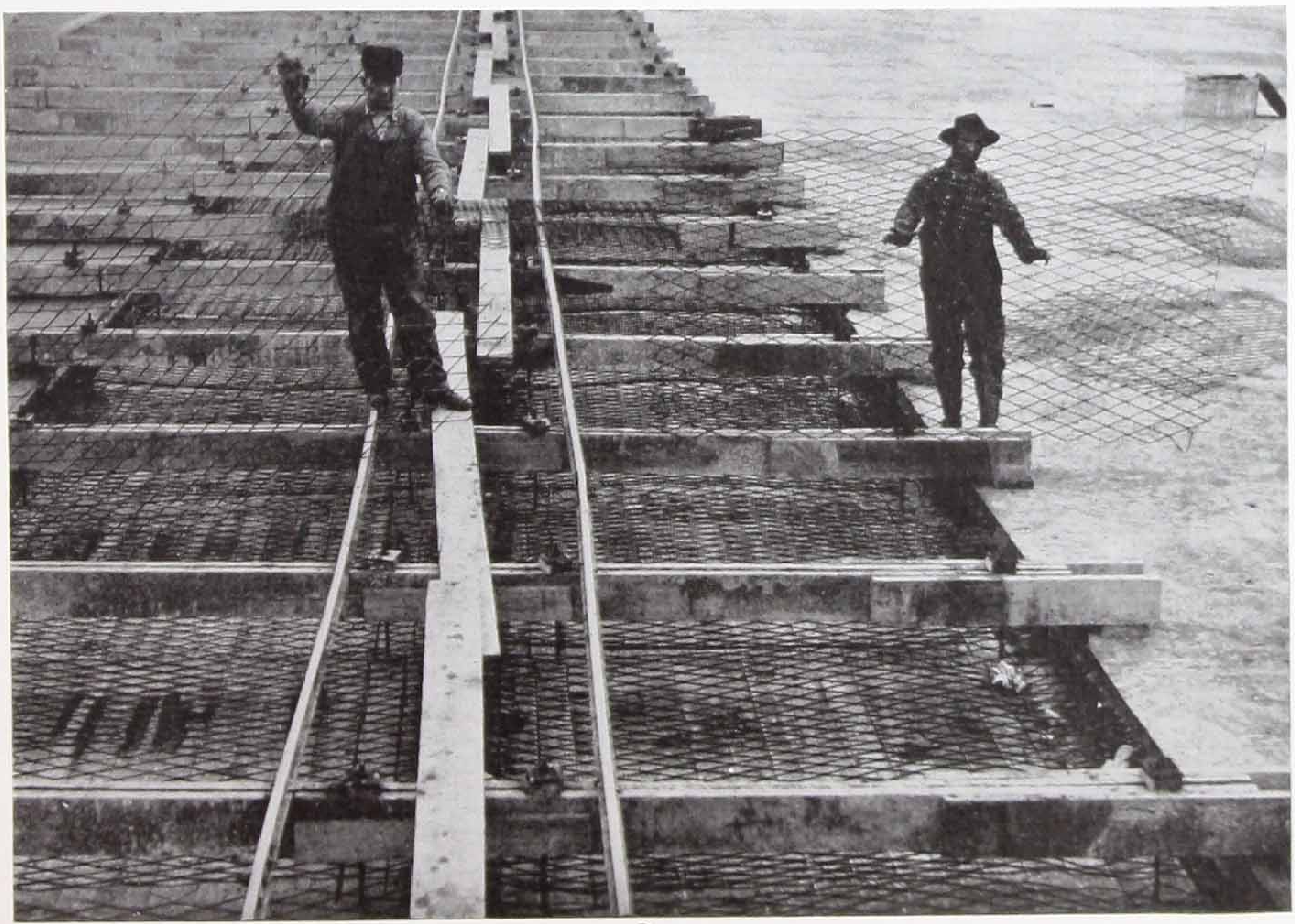
Expanded Metal Styles, Weights and Standard Size Sheets

Style	Approx. Weight Per Sq. Ft. in Pounds	Deliveries	Standard Size Sheets	
			Lengths	Widths
			Long Way of Diamond	Short Way of Diamond
3-10-176	.60	Carried in Stock in Standard Sheets	6′, 8′, 9′, 10′-8″	3′, 4′, 5′, 6′
3-10-265	.90		6′, 8′, 9′, 10′-8″	4′, 5′-4″
3-10-353	1.20		6′, 8′, 9′, 10′-8″	3′, 4′, 6′
3-12-150	.51		6′, 8′, 9′, 10′-8″	3′, 4′, 6′
1½-12-194	.66		6′, 8′	3′, 4′, 6′
¾-12-246	.84		6′, 8′	3′, 4′, 6′
3-10-324	1.10	Five Days to Two Weeks Dependent on Size Order And Unfilled Business on Books	6′, 8′, 9′, 10′-8″	4′-4″
3-10-25	.85		6′, 8′, 9′, 10′-8″	5′-8″
3-10-20	.68		6′, 8′, 9′, 10′-8″	5′-6″
3-10-162	.55		6′, 8′, 9′, 10′-8″	3′, 4′-6″
3-10-15	.51		6′, 8′, 9′, 10′-8″	3′, 6′
3-12-125	.425		6′, 8′, 9′, 10′-8″	4′-4″, 6′-6″
3-12-10	.34		6′, 8′, 9′, 10′-8″	4′, 6′-4″
3-16-082	.278		6′, 8′, 10′-8″	3′, 4′, 5′, 6′
3-16-059	.20		6′, 8′, 10′-8″	3′, 4′, 6′
2¼-12-164	.56		6′, 8′, 10′-6″	4′, 5′
2¼-16-118	.40		6′, 8′, 10′-6″	3′, 4′, 6′
2¼-16-10	.34		6′, 8′, 10′-6″	4′, 5′
2-12-161	.547		6′, 8′	4′, 5′
2-16-103	.351		6′, 8′	4′, 5′
1½-12-181	.61		6′, 8′	4′-3″
1½-16-105	.36		6′, 8′	4′, 5′
1½-18-088	.308		6′, 8′	3′, 6′
1-12-234	.796		6′, 8′	4′-8″
1-16-175	.597		6′, 8′	3′, 4′, 6′
1-18-125	.425		6′, 8′	4′-4″
¾-16-154	.525		6′, 8′	4′-4″
¾-18-147	.50		6′, 8′	3′-8″
½-18-220	.75		6′, 8′	4′
3-7-609	2.00	Mill Shipment Only	6′, 8′, 9′, 10′-8″	5′
3-6-550	1.87		6′, 8′, 9′, 10′-8″	3′, 4′, 6′
3-6-500	1.70		6′, 8′, 9′, 10′-8″	4′-4″
3-6-450	1.53		6′, 8′, 9′, 10′-8″	4′-8″
3-7-400	1.36		6′, 8′, 9′, 10′-8″	5′

Note — Interpret styles as follows: — For example 3-10-176. 3 equals short dimension of Diamond in inches 10 equals approximate gage; 176 equals .176 square inches sectional area per foot of width.



Tod Memorial School, Youngstown, Ohio. GF Expanded Metal for Floor Reinforcement. Architect, Ed. R. Thompson. Contractor, J. Bucheit



Reservoir, Portsmouth, Ohio—70,000 Square Feet Expanded Metal used in Roof

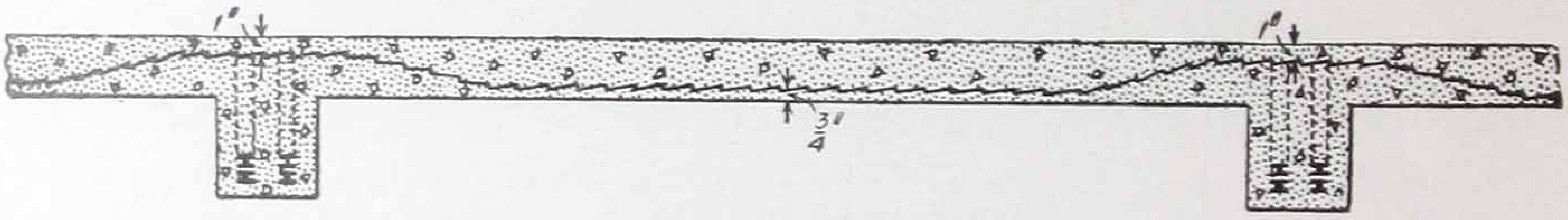
Slab Tables

The tables on the opposite page give the *safe live load*, in pounds per square foot, for stone concrete slabs, reinforced with different weights of *Expanded Metal*, on spans ranging from four feet to twelve feet by steps of six inches, and for slabs varying in thickness by half-inches from three inches to eight inches.

Above each table is noted the style of *Expanded Metal* upon which the table is based. The sectional area of the reinforcement per foot of width, and the weight of the reinforcement per square foot, are found by reference to the table on page 92.

The stresses figured for the steel in tension, and concrete in compression and in shear, are indicated above the tables. The concrete is considered in these tables as offering no tensile resistance.

All of the tables are based upon reinforcement three-quarters of an inch above the bottom of the slab at the point of greatest moment, and bending it up to within one inch of the top of the slab over the supports. Sketch "A" shows the location of the reinforcement.



Sketch "A"–Location of Expanded Metal Reinforcement

Stress of Steel in Tension, 16,000 lbs. per sq. in.

Extreme Fibre Stress of Concrete in Compression 800 lbs. per sq. in.

Concrete in Shear, not over 60 lbs. per sq. in.

Ratio of Moduli of Elasticity taken as 15.

Straight Line Formula.

Bending Moment $\frac{1}{12}$ WL^2.

(a) For BM $\frac{1}{10}$ WL^2 add dead weight of slab to safe live load given below; multiply the sum by .83 and subtract the dead weight to obtain the new safe live load.

(b) For BM $\frac{1}{8}$ WL^2 proceed as in (a) multiplying by .67 instead of .83.

SLAB TABLE No. 1

Style 3-12-150 or 3-10-150 Expanded Metal

Slab	Span																
	4'0"	4'6"	5'0"	5'6"	6'0"	6'6"	7'0"	7'6"	8'0"	8'6"	9'0"	9'6"	10'0"	10'6"	11'0"	11'6"	12'0"
3"	264	200	156	122	97	78	62	49									
3½"	329	250	196	154	123	99	79	63	51	40							
4"	393	300	235	185	148	119	96	77	62	50	39	30	23				
4½"	457	349	273	216	173	140	113	91	74	59	47	37	28	20			
5"	521	396	311	246	197	159	129	105	85	68	54	43	33	24			
5½"	585	447	351	278	223	180	147	121	97	78	63	49	38	29	20		
6"	648	495	389	308	248	201	163	133	108	87	70	56	43	33	23		
6½"	712	546	428	340	273	221	180	147	120	97	78	63	49	37	26		
7"	780	598	470	372	300	244	199	162	132	108	87	69	54	42	30	21	
7½"	845	646	508	403	325	264	215	176	144	117	94	76	60	46	33	23	
8"	909	696	547	434	350	285	232	190	155	126	102	82	65	50	37	26	

SLAB TABLE No. 2

Style 3-10-176 Expanded Metal

Slab	Span																
	4′0″	4′6″	5′0″	5′6″	6′0″	6′6″	7′0″	7′6″	8′0″	8′6″	9′0″	9′6″	10′0″	10′6″	11′0″	11′6″	12′0″
3″	313	240	188	148	119	96	78	63									
3½″	390	298	234	186	150	121	99	81	66	53							
4″	468	359	282	224	181	147	120	98	81	66	54	44	35				
4½″	540	417	327	261	210	172	140	115	95	78	63	51	41	32	25		
5″	618	475	374	298	241	197	161	133	110	90	74	60	49	38	30	22	
5½″	692	532	418	334	270	221	181	150	123	101	83	68	56	44	34	26	
6″	764	588	464	370	300	245	201	166	137	113	93	76	62	50	39	29	21
6½″	852	657	517	415	336	274	226	187	154	128	105	87	71	57	45	35	25
7″	926	715	564	451	366	299	246	204	169	140	115	95	78	63	50	38	28
7½″	1005	774	610	488	396	324	267	221	184	152	126	104	85	69	55	43	32
8″	1089	839	661	529	430	352	290	241	200	166	138	113	93	76	61	47	35

SLAB TABLE No. 3

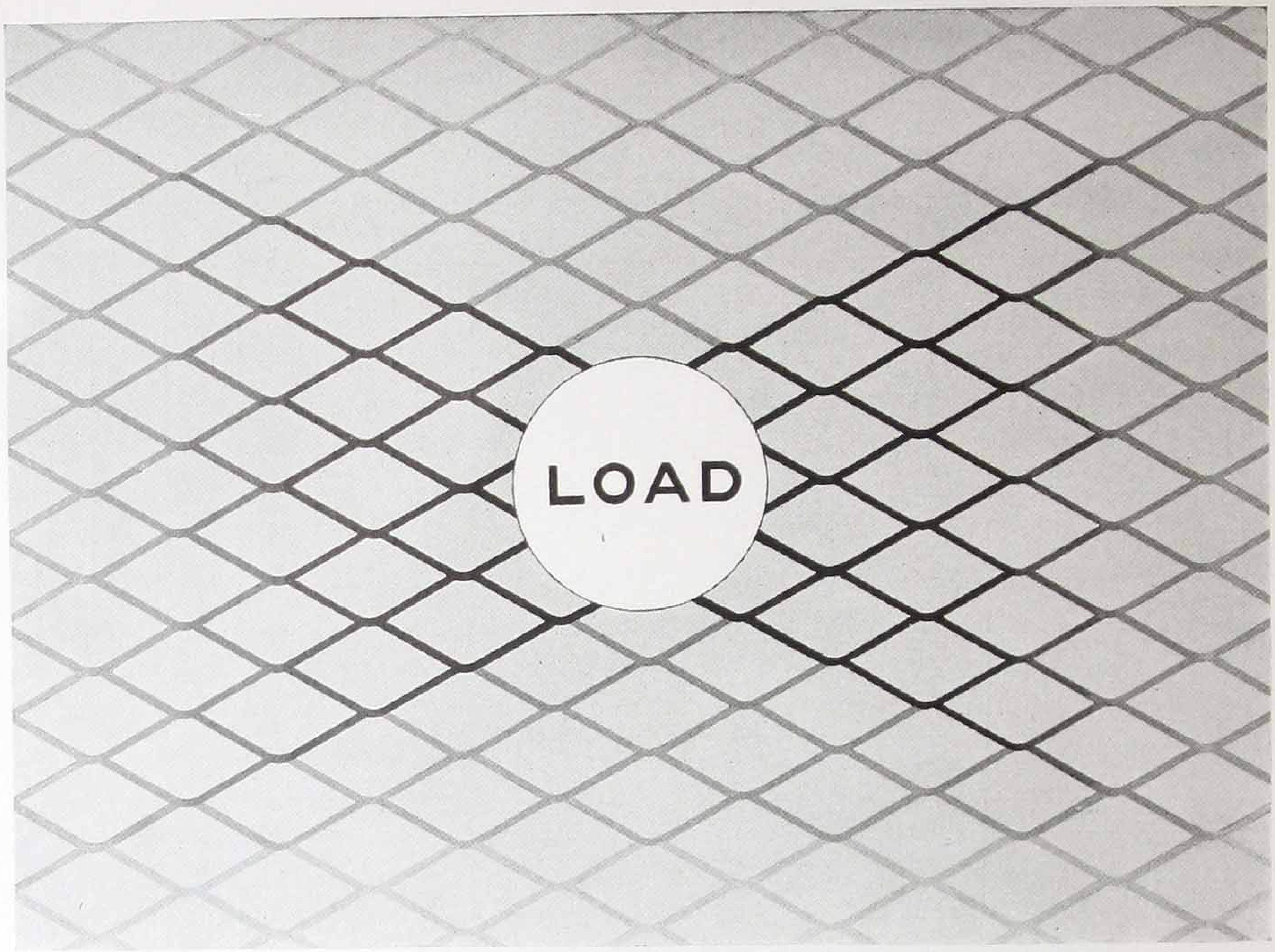
Style 3-10-265 Expanded Metal

Slab	Span																
	4′0″	4′6″	5′0″	5′6″	6′0″	6′6″	7′0″	7′6″	8′0″	8′6″	9′0″	9′6″	10′0″	10′6″	11′0″	11′6″	12′0″
3″	477	368	293	235	192	159	132	110									
3½″	593	459	365	294	240	199	166	139	117	100							
4″	709	548	436	352	288	238	200	167	141	119	101	86	73				
4½″	826	639	509	411	337	279	234	197	166	141	120	102	87	74	63		
5″	945	732	583	471	386	320	268	226	191	163	138	118	101	86	73	62	52
5½″	1062	823	656	530	435	361	302	255	216	184	157	134	115	98	83	70	59
6″	1179	914	729	589	484	402	336	284	241	205	175	150	128	110	94	79	67
6½″	1295	1004	800	647	532	442	370	312	265	226	193	166	142	121	104	88	75
7″	1411	1095	872	705	580	482	404	341	290	247	211	182	155	133	114	97	82
7½″	1528	1185	945	764	629	523	438	370	314	268	230	198	169	145	124	106	90
8″	1644	1275	1017	823	677	563	472	399	339	289	248	213	183	157	134	115	97

SLAB TABLE No. 4

Style 3-10-353 Expanded Metal

Slab	Span																
	4′0″	4′6″	5′0″	5′6″	6′0″	6′6″	7′0″	7′6″	8′0″	8′6″	9′0″	9′6″	10′0″	10′6″	11′0″	11′6″	12′0″
3″																	
3½″	790	614	491	397	328	273	230	195	166	142							
4″	946	735	588	477	394	328	277	234	200	172	148	129	111				
4½″	1104	858	687	557	460	384	324	275	235	202	174	152	131	114	99		
5″	1260	979	784	636	526	439	371	314	270	232	200	175	151	132	114	100	86
5½″	1416	1103	883	717	593	495	418	355	305	262	227	198	171	150	130	114	99
6″	1573	1226	982	796	659	551	465	396	340	293	353	221	191	167	146	128	111
6½″	1732	1349	1082	878	726	607	513	437	374	323	279	244	211	185	161	142	123
7″	1892	1473	1182	960	794	662	561	478	410	354	306	267	232	204	177	156	136
7½″	2053	1600	1283	1043	864	723	611	520	446	385	333	291	253	222	194	168	148
8″	2214	1724	1383	1124	930	778	658	560	481	415	359	314	273	240	209	184	160



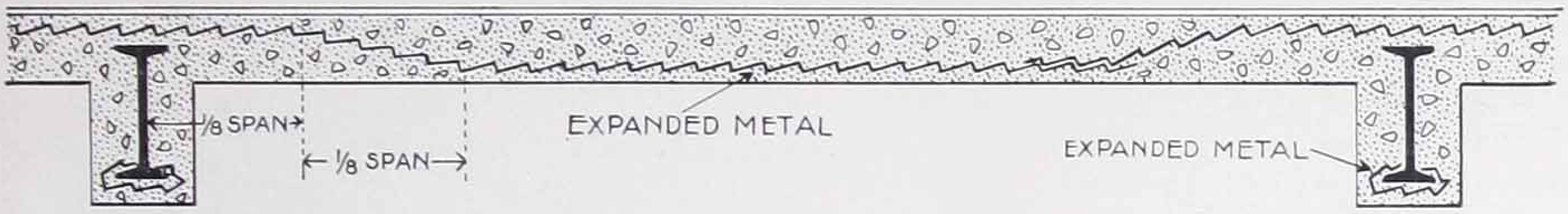
Expanded Metal Floors

In concrete floors, the peculiar advantages of expanded metal reinforcement have special value. The varying conditions of loading, from the severe shock of heavy falling bodies to the massive uniform load, are all provided for by the action of the expanded metal under stress. The illustration above shows the manner in which the strains from concentrated loads are diffused over wide areas by the diagonal strands of the mesh. The sheets of expanded metal made up of diagonal strands also permit the cutting of holes for circular stairs, flues, pipes or belts in floors without weakening the slab because the continuous net work of steel will carry the stresses around the opening.

Expanded metal floors may be used economically on any reasonable spans, though short spans with light slabs are usually preferrable. As a general rule, the mix for the concrete should be one part Portland cement, two parts clean sharp sand, and four parts crushed stone or gravel. For long spans and heavy loads, stone concrete should be used, but for ordinary purposes, cinder concrete (using good clean boiler cinders) is amply strong and is about one-third lighter.

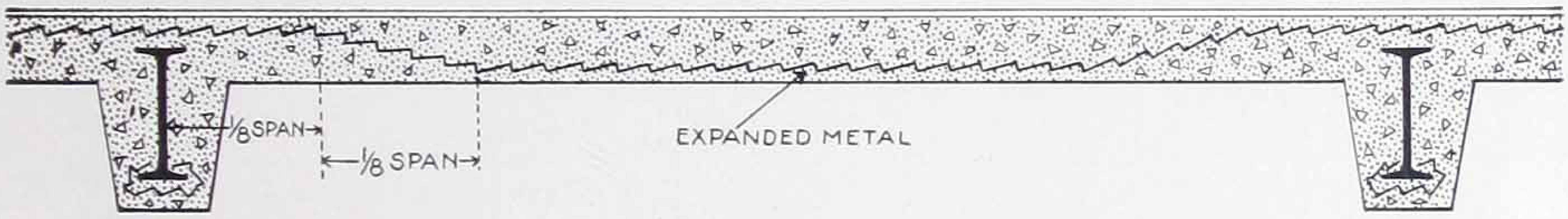
The types of floors shown on the following pages have all been used successfully under varying conditions, and these designs used in connection with the slab tables given on pages 94 and 95, can be adapted to any type of building.

Expanded Metal Floors



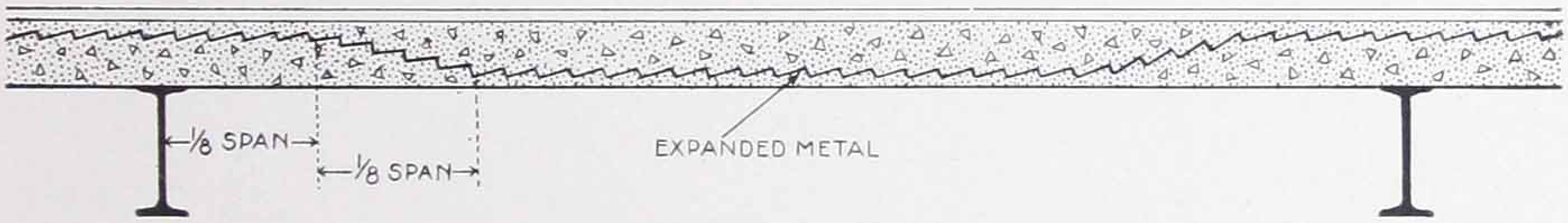
TYPE "A"

This is the most common type of expanded metal floor—beams fireproofed with 2 inches of concrete and slab extending about 2 inches above the beam. Expanded metal is raised over the beams to care for negative stresses and the lap occurs at the quarter point in the span.



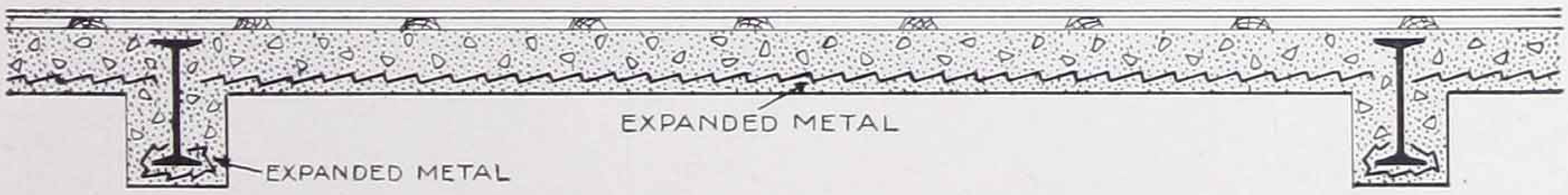
TYPE "B"

This type is very similar to type "A," the only difference being the shape of the fireproofed beams. Forms are a little more costly than the preceding style, but for appearance sake this style is often preferred.



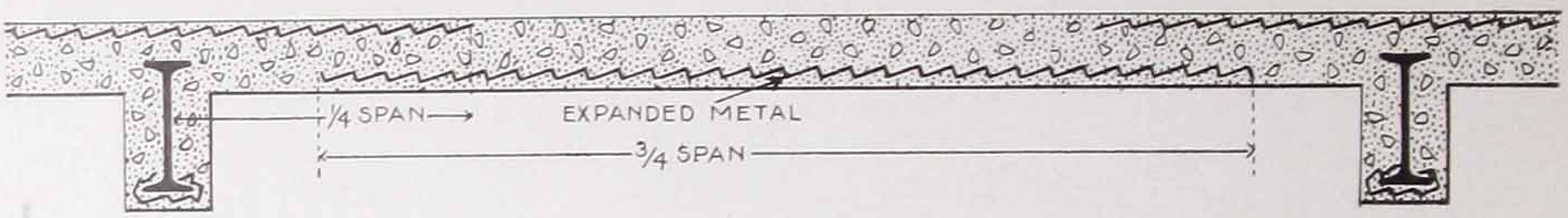
TYPE "C"

This type of floor is often used where the beams are to be protected by a suspended ceiling of metal lath and plaster. Forms are built flush with the top of the steel beam and the slab, resting entirely on the beam is absolutely continuous.



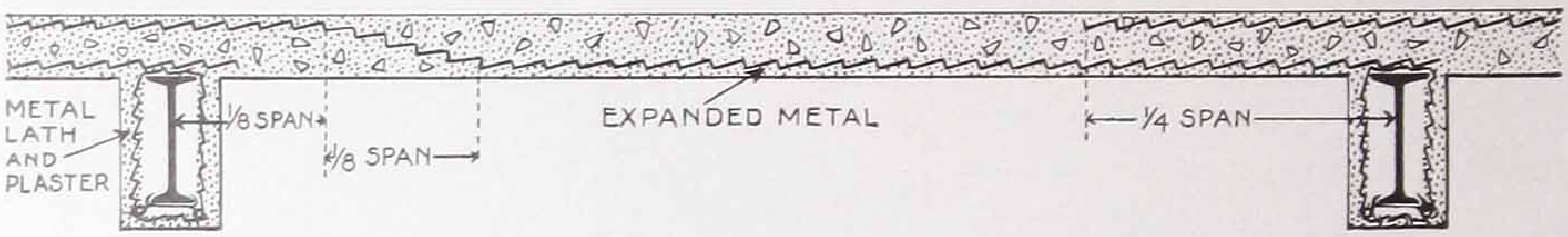
TYPE "D"

In this type of floor the expanded metal rests on the edges of the beam boxes and the slab comes practically flush with the top of the beam. On this is placed a wood or composition flooring. Much used where the slight gain in head room is desirable.



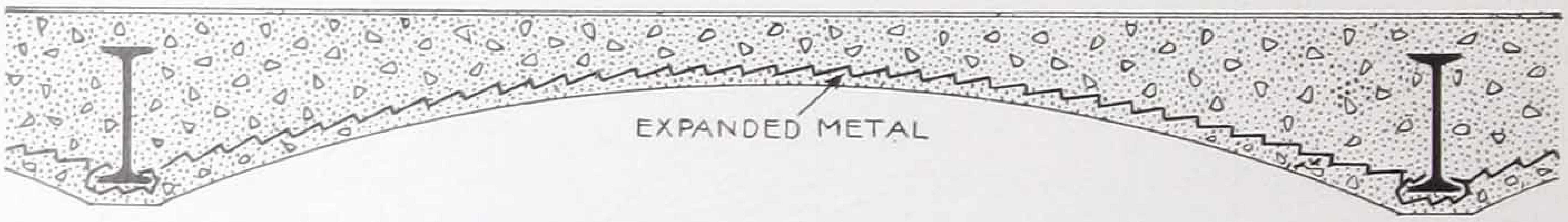
TYPE "E"

This is very similar to type "A," the main difference being that negative stresses are cared for by separate sheets of expanded metal. While this takes more steel than the preceding types, it often permits the use of short or odd sheets of expanded metal, where long sheets are not readily available. The sheets over the beams are worked into place after the concrete is poured.



TYPE "F"

This is similar to type "C," except that beams are fireproofed with metal lath and plaster and the expanded metal is so placed as to avoid two laps in long span work or where the length of the span does not work out to advantage with stock size expanded metal sheets.



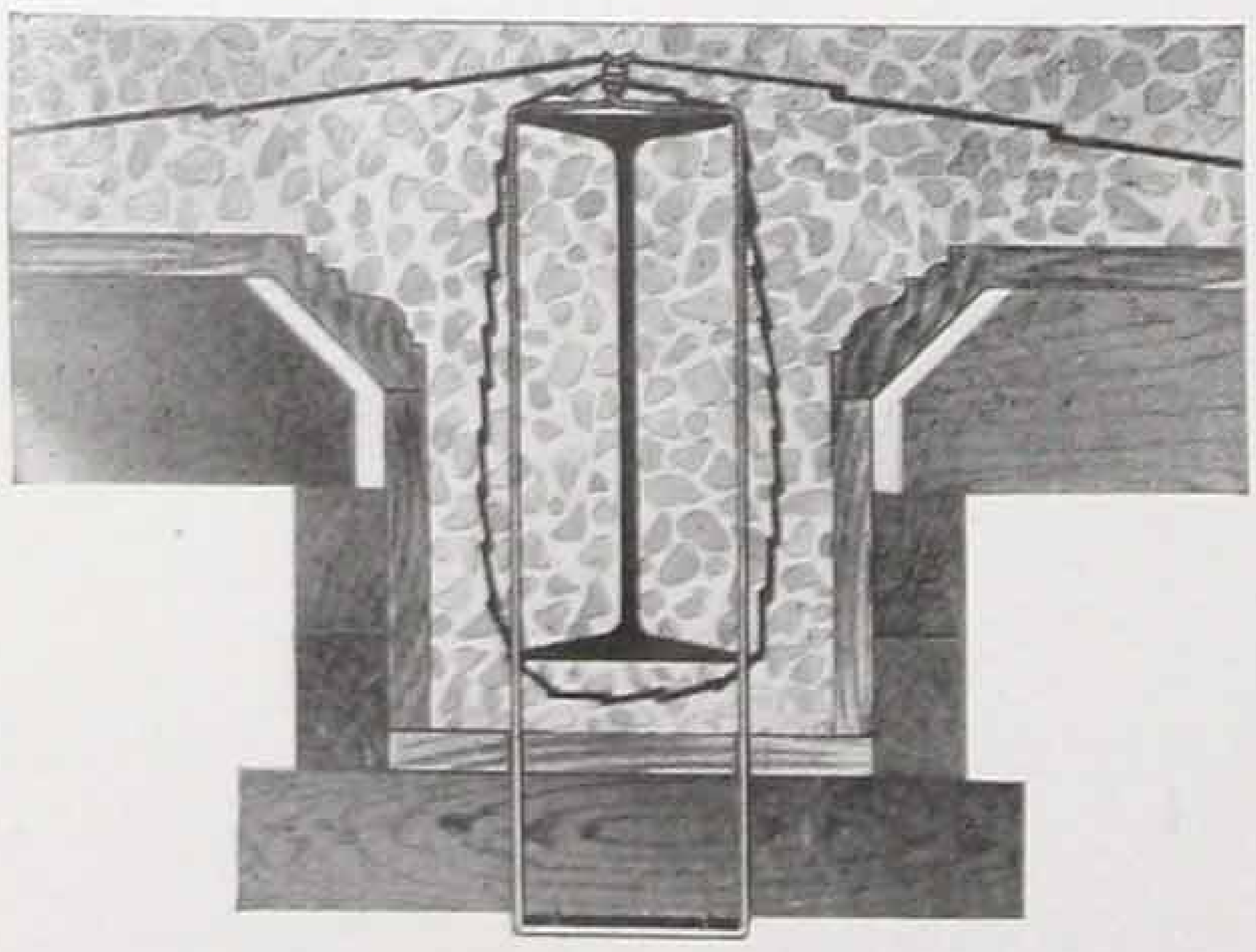
TYPE "G"

Used for extra heavy loads, the arched slab is recognized as a most effective type. Expanded metal will follow the line of the form without the necessity of either field or shop bending, and saves much time in placing of steel. Cinder concrete is often used in this type and will reduce the dead load materially.

Expanded Metal Roofs

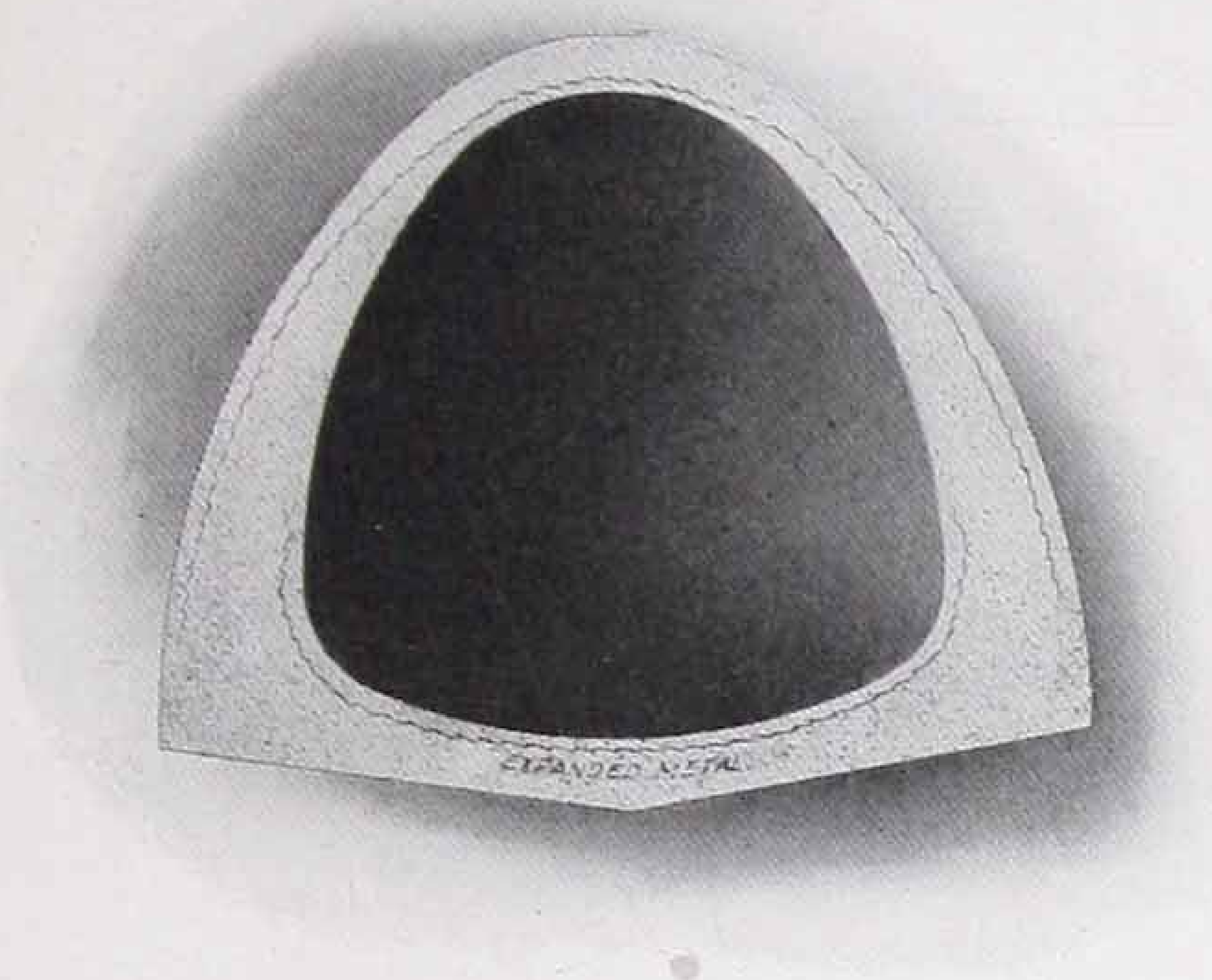
Concrete roofs reinforced with expanded metal are constructed along the same general lines as floor work, though, of course, the lighter loads permit the more extended use of the lighter gauges of expanded metal.

Fireproofing Steel Beams



In the fireproofing of steel beams, with concrete, expanded metal is an economical and efficient reinforcement. The beams are merely wrapped with a light gauge expanded metal before the forms are placed and the concrete poured. Thus the beam is encased in a solid shell of concrete, reinforced and bound together with a continuous network of steel. This method of fireproofing precludes the danger from concrete falling from beams even under intense heat.

Sewers, Conduits and Water Pipes



In the reinforcement of this class of work, the advantages of Expanded Metal are very apparent.

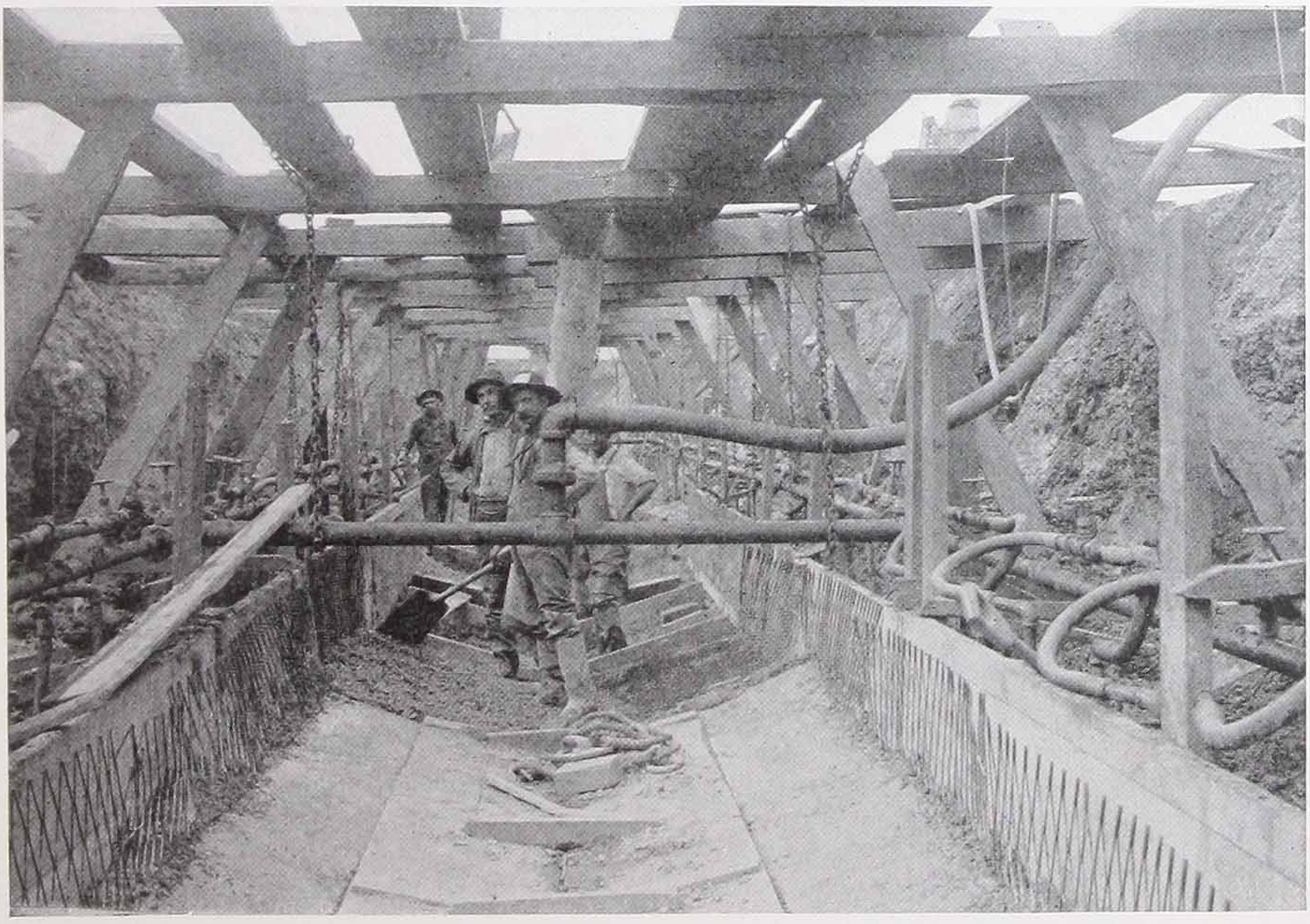
First, the sheets furnished cut to the required size are readily placed and are held in place much easier than any other class of reinforcing.

Second, the varying superimposed loads on underground work of this kind due to unequal filling, etc., make necessary a reinforcement which will distribute strains from unequal loadings, and Expanded Metal is most effective in this respect.

The most favorable design for sewers and conduits is parabolic, as shown in illustration at top of page. The circular form is commonly used, however, and will be found satisfactory under many conditions.

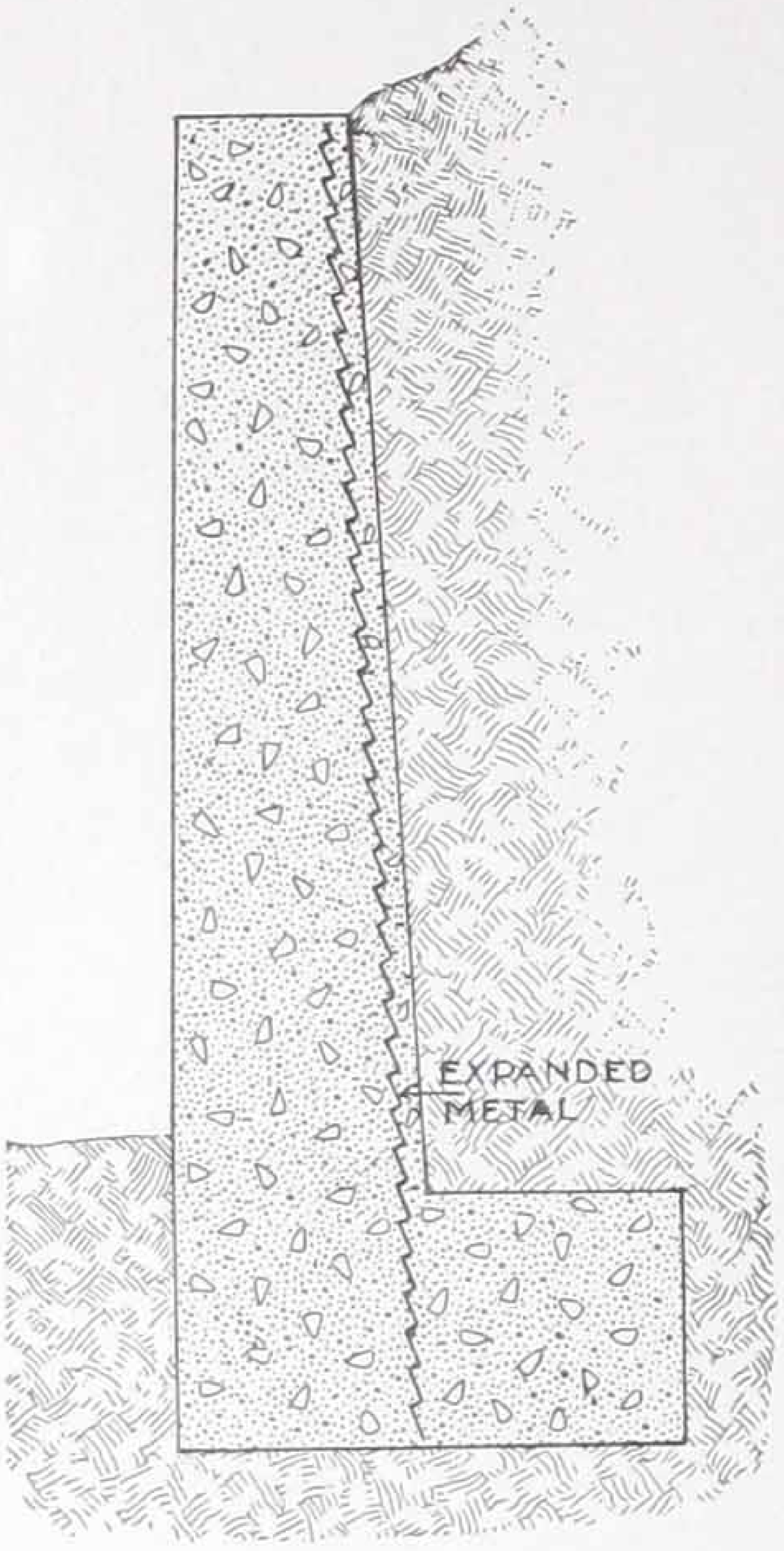
In water mains and conduits which are designed for internal pressure, the Expanded Metal is placed nearer the outer face of the slab.

Concrete sewers built with Expanded Metal are cheaper than either brick or tile, particularly in the larger sizes, and contrary to malicious claims made by competing interests, they have been proven durable and sanitary.



Trunk Line Sewer at La Porte, Indiana

Retaining Walls



Widely varying conditions make it almost necessary to design every retaining wall to meet its own requirements. While the principles are the same, in a general way, for any class of concrete reinforced work, the purpose of the wall, the nature of the soil and location are governing factors which are never the same in any two cases. The accompanying illustration shows a common type, but our engineering department will be glad to make specific recommendations for each individual case, and the best results will be obtained in this way.

Expanded Metal has been widely used for this work—in ordinary earth retaining walls, dams, reservoirs and sea walls. It is easy to place and assures permanently correct location of the steel.

Bridges and Culverts

The use of reinforced concrete for bridges and culverts is being adopted almost universally. Where wood decays and steel corrodes, concrete stands up under the action of the elements absolutely without deterioration. The State Highway Commissions in many states are specifying it in all cases and are finding a saving not only in the elimination of maintenance expense, but in many instances even in first cost.

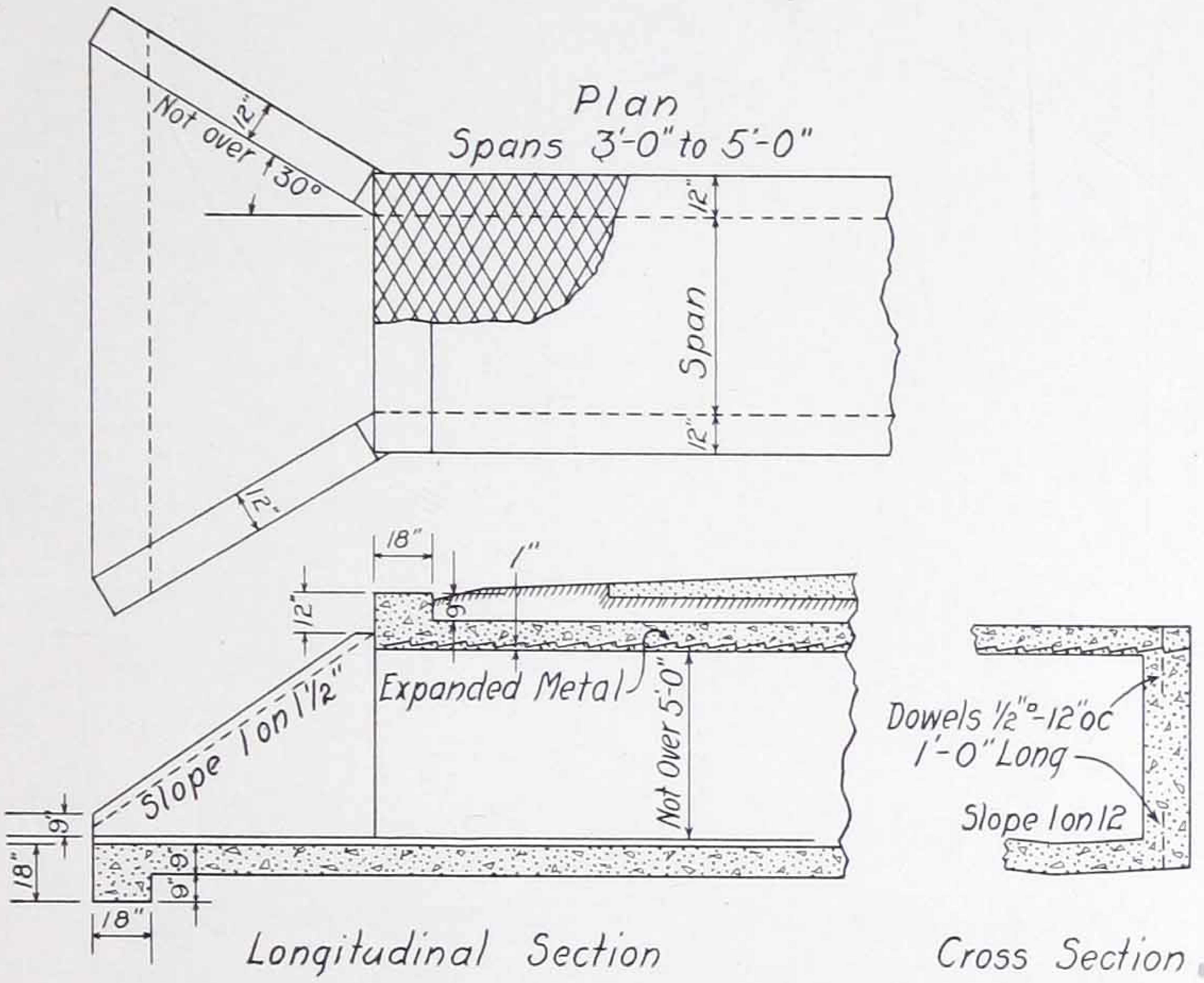
The construction is very similar to floor work described in preceding pages, and the fact that bridges are always subject to varying concentrated and rolling loads, makes Expanded Metal a valuable type of reinforcement, scattering over a wide area as it does the strains imposed on any one section.

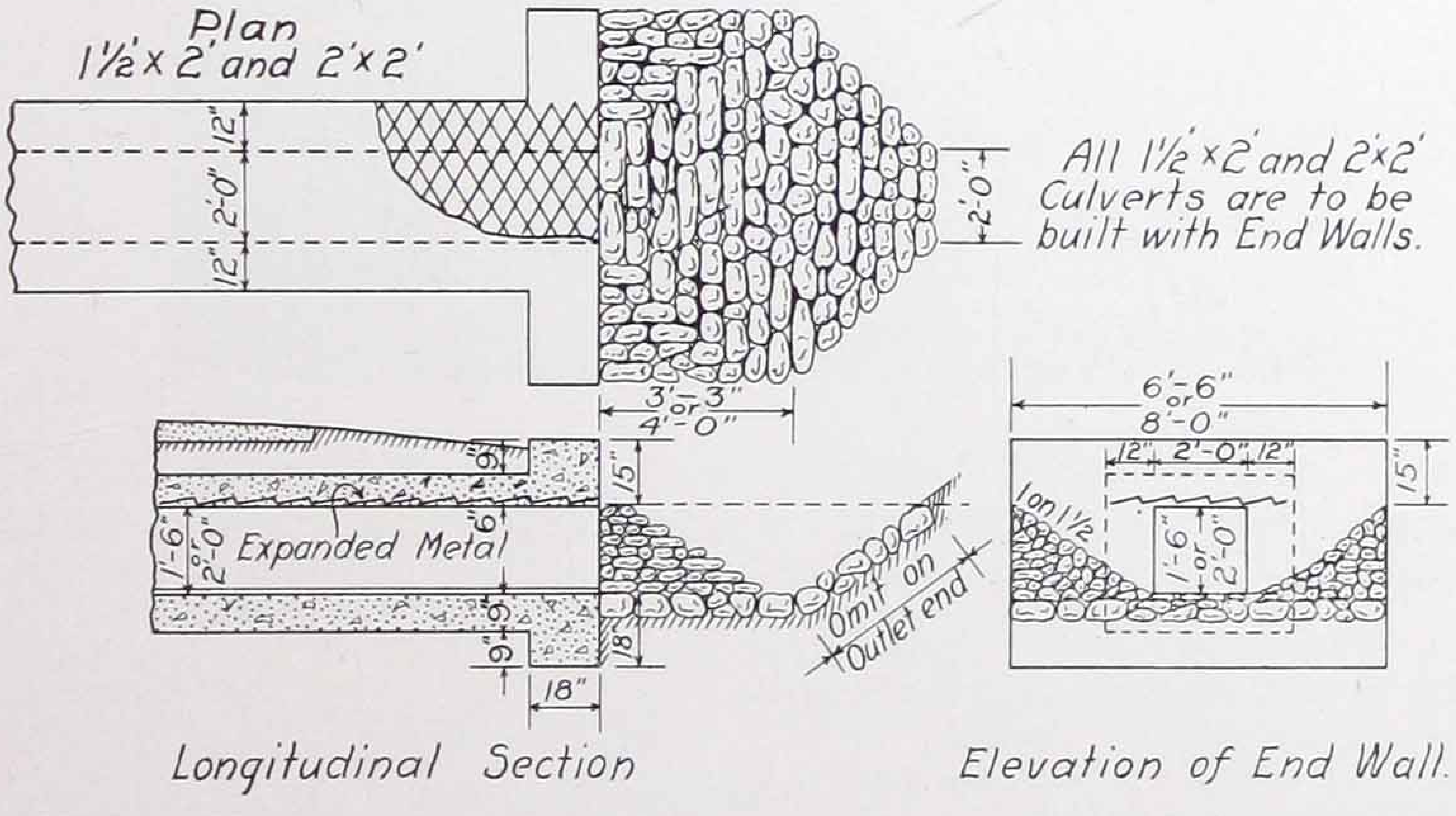
Concrete bridges are of three types: the flat slab bridge, the girder type and the concrete arch.

The flat slab is economical up to 12 feet, the girder type from 12 feet to 50 feet, and the concrete arch for larger spans.

Special recommendations will be furnished by our engineering department for any particular case, on request.

Concrete Culverts Reinforced with Expanded Metal as Specified by the New York State Road Commission on all State and County Highways





"Diamond-Rib" Expanded Metal Lath

Diamond-Rib Expanded Metal Lath is adapted for all kinds of work, but is especially suitable for curved surfaces, due to its uniform pliability.

The flat ribs make "Diamond-Rib" Lath easy to handle and erect. A small mesh insures its complete envelopment in plaster, with the use of a minimum amount of material. The large sheets reduce the number of laps and save both labor and material.

Furnished as Follows

Diamond-Rib Lath is furnished painted, "Armco" iron painted or galvanized—not unpainted—as follows:

Sheets — 24 x 96 inches — $1\frac{7}{9}$ sq. yds.

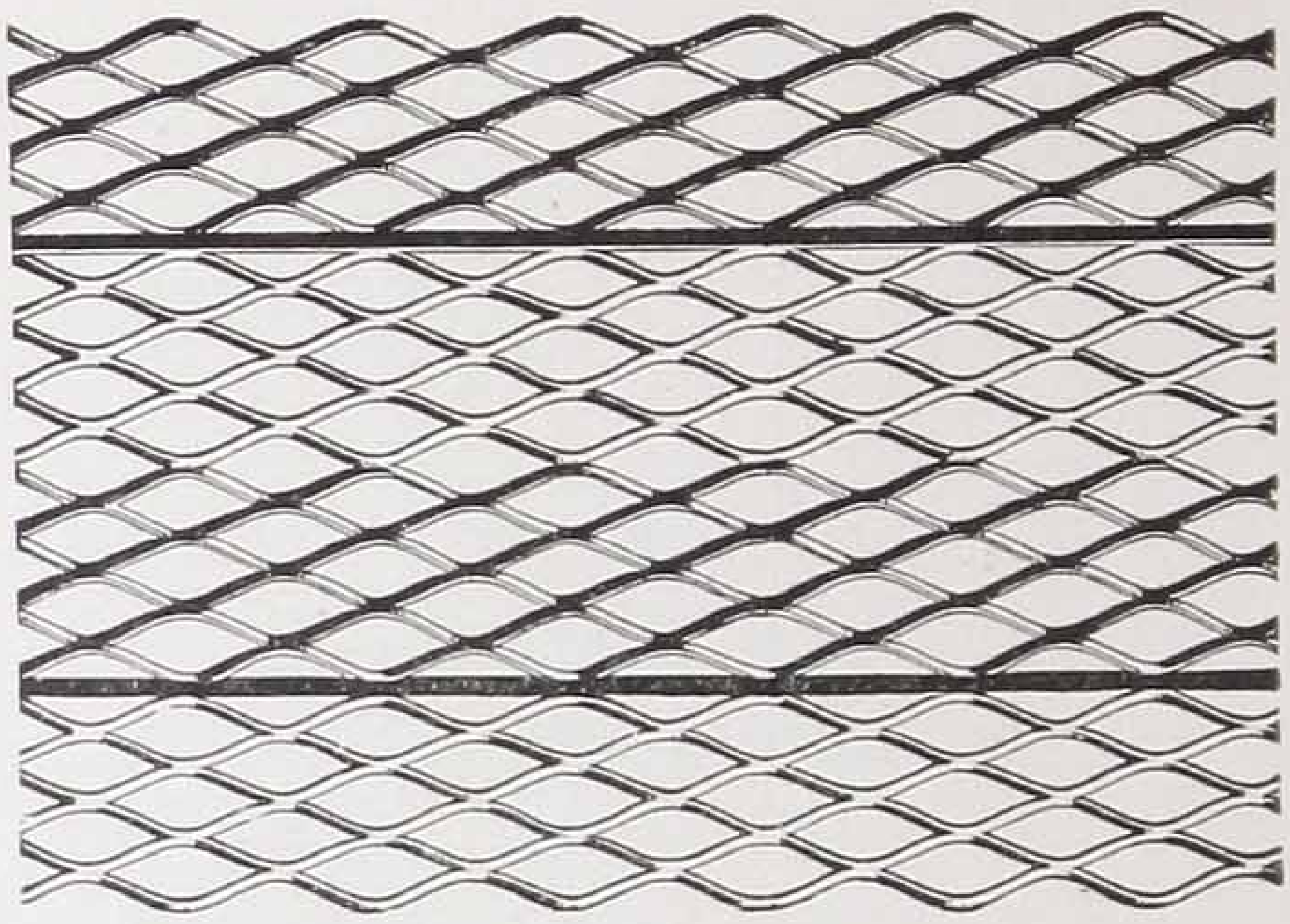
Packed 15 sheets — $26\frac{2}{3}$ yds. to the bundle.

Approximate weight per square yard:

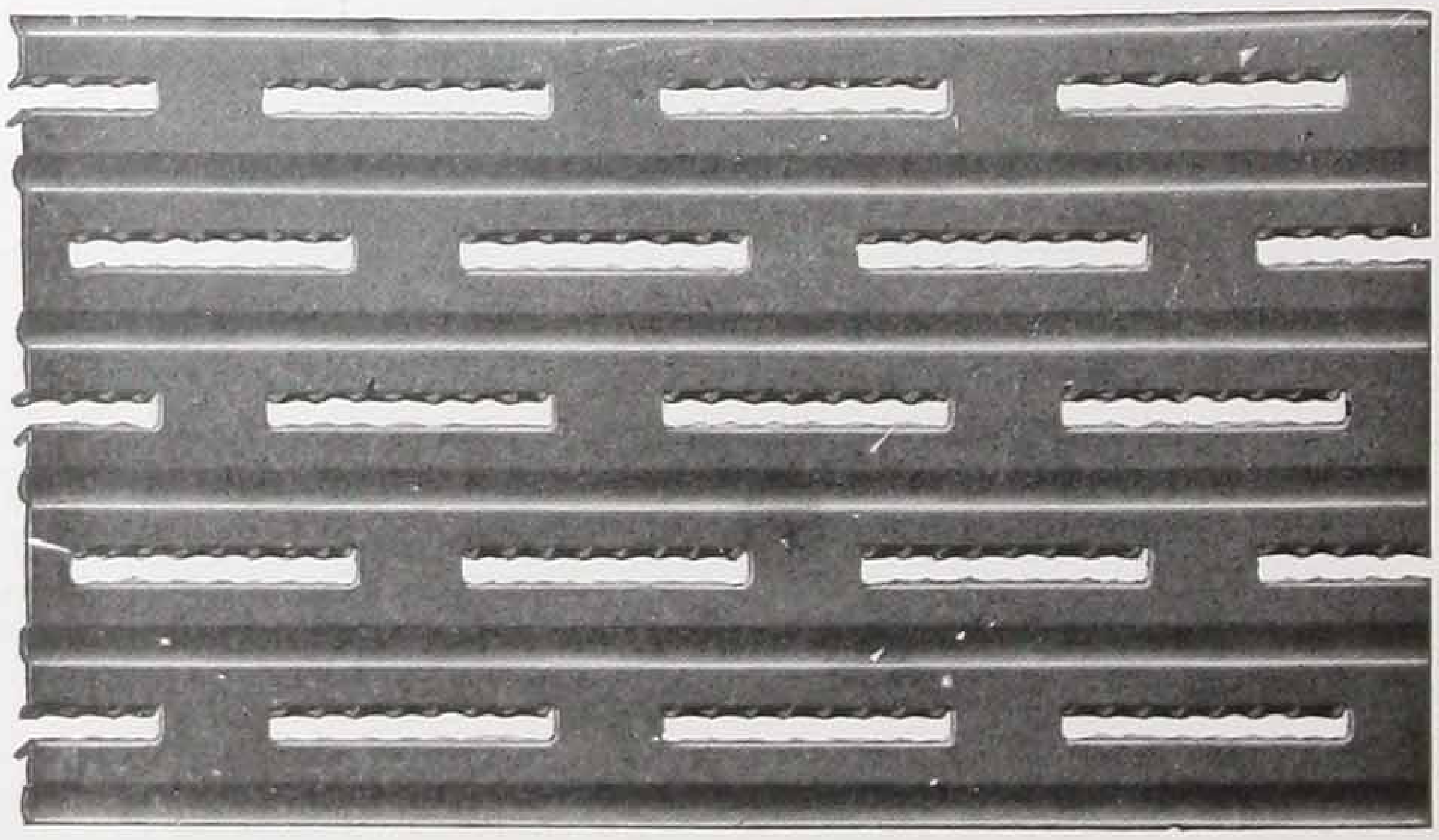
Gauge	Painted	Galvanized	"Armco" Iron
27	2.30 lbs.	2.73 lbs.	2.30 lbs.
26	2.50 lbs.	2.94 lbs.	Not Made
25	3.05 lbs.	3.32 lbs.	Not Made
24	3.40 lbs.	3.74 lbs.	3.40 lbs.
22	4.00 lbs.	Not Made	Not Made

All gauges are U. S. Standard, which is approximately one gauge heavier than Birmingham Wire Gauge.

Ask for a sample of "Diamond-Rib" Lath.



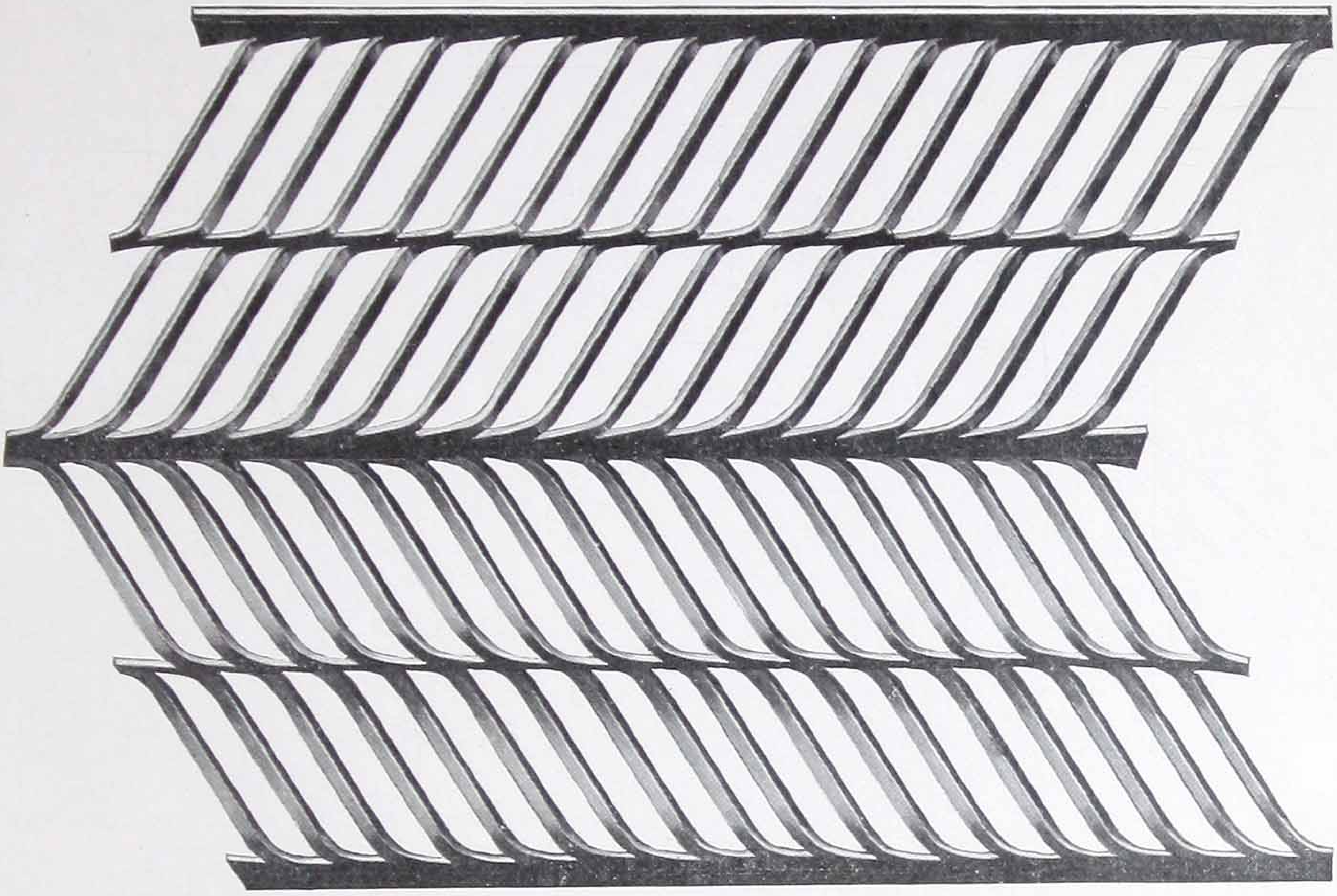
Genfire Sheet Steel Lath



A metal lath to be used where plaster economy is a feature. Takes even less plaster than wood lath; is fireproof, vermin proof and gives a surface free from cracks and stains.

Sheets, $13\frac{1}{2}$ x 96 inches—1 square yard.
Sheets, 24 x 96 inches—$1\frac{7}{9}$ square yards.
Packed, 10 sheets to a bundle.
Weight, 4.6 pounds per square yard.
Always furnished painted.

Herringbone Expanded Metal Lath



Style "BB"

This lath is the accepted standard wherever metal lath is used. Its rigidity, giving firm plastering surface and allowing wide spacing of studding; its wide sheets; its flat strands, which spread rather than cut the plaster; its perfect key—all combine to make a lath that is most desirable to the owner, architect or contractor.

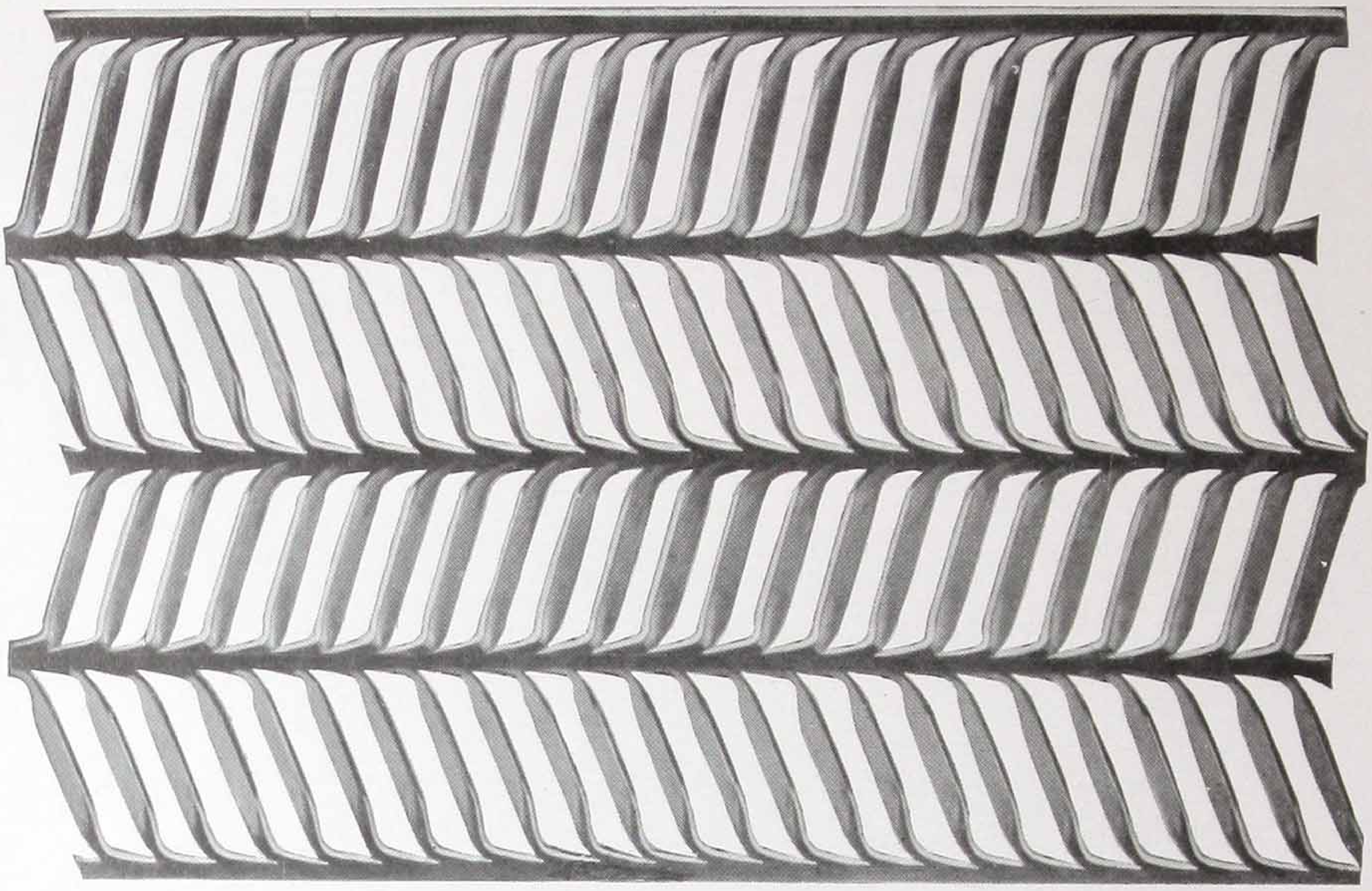
Packed 15 sheets—22½ square yards to the bundle.
Size sheets—20¼ x 96 inches—1½ square yards.
Size mesh—$\frac{7}{32}$ x 1¼ inches.

Approximate weights per square yard:

27 gauge	2.25 pounds	26 gauge	2.50 pounds
24 gauge	3.37 pounds	22 gauge	4.21 pounds
27 gauge, Galvanized	2.82 pounds	24 gauge, Galvanized	3.91 pounds

Furnished painted or galvanized, except 26 and 22 gauges, which are not furnished galvanized.

Herringbone Expanded Metal Lath



Style "A"

Style "A-28" Herringbone Expanded Metal Lath is recommended particularly for ceilings. This is because it has heavier ribs and smaller openings than other styles, which enables it to successfully carry the heavy load of plaster required for ceilings.

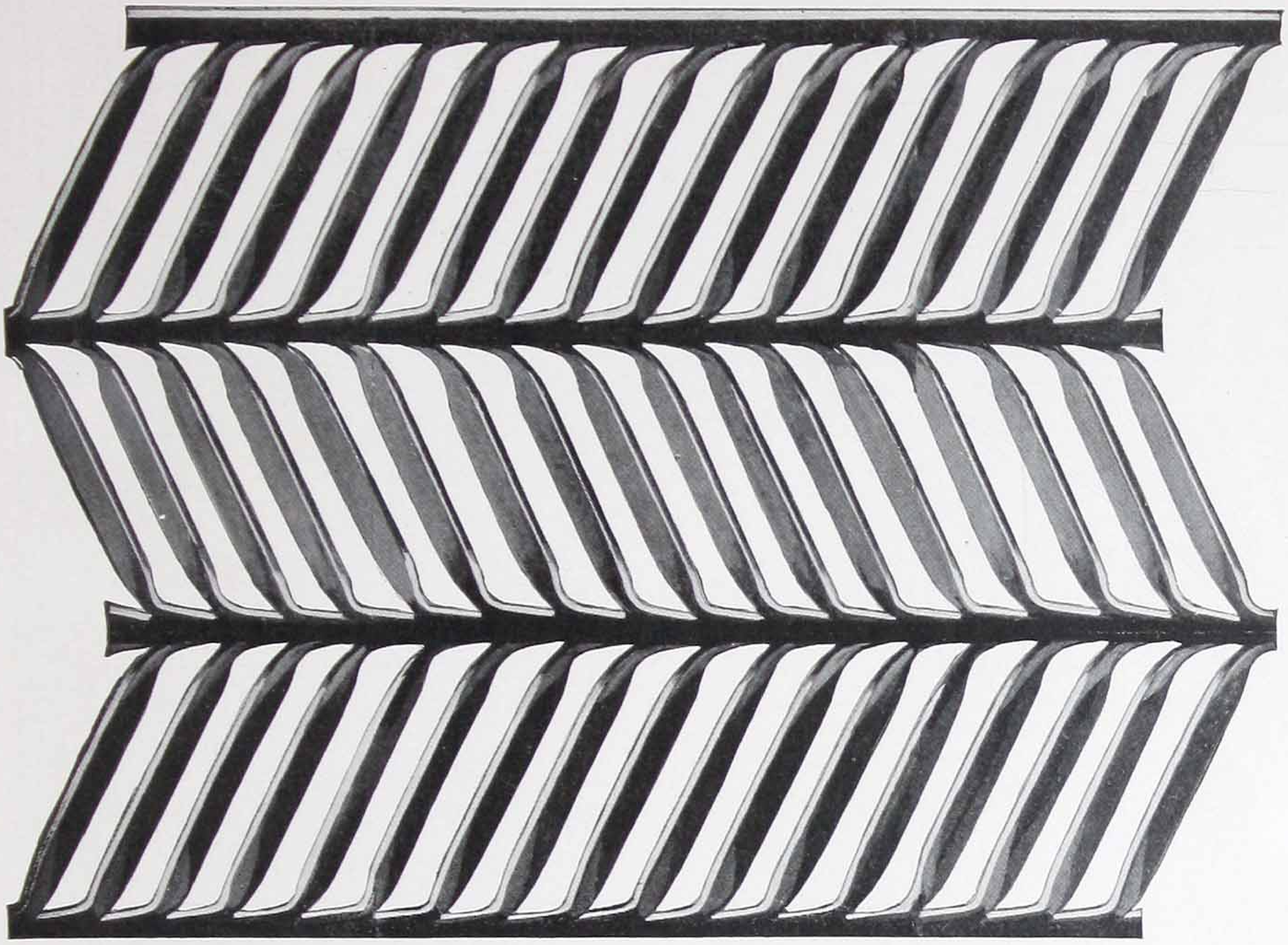
Ceilings plastered on Style "A-28" Herringbone are fire-retardant durable and eliminate all danger of falling plaster. The extreme rigidity of this style permits of its erection on joists or ceiling bars 16 inches on centers without any possibility of its sagging between supports. This insures a uniform thickness of plaster throughout, which means a satisfactory finished job and freedom from unsightly surface cracks.

Metal lath should be specified not only by gauge but by weight per square yard as well. Style "A-28" is heavier than most other makes of lath of the same gauge. Where cost will permit, it is the ideal lath to use on all plaster work. Always furnished painted when not ordered galvanized—no uncoated lath.

Packed 20 sheets—20 square yards to the bundle.
Size sheets—13½ x 96 inches—1 square yard.
Size mesh—$\frac{3}{16}$ x 1 inch.
Weight per square yard:

28 gauge - - - - - - - -	3 pounds	28 gauge, Galvanized - - -	3.75 pounds

Herringbone Expanded Metal Lath



Style "AAA"

The strength of metal lath is dependent upon two factors—its design and weight. Both are combined in a high degree in the manufacture of this style. It is the "general purpose" Herringbone—its use insuring excellent results whether used for partitions, ceilings or cement siding. From the illustration it is seen that every rib is a heavy rib. This means increased rigidity. The table below gives the approximate weights per square yard and the stud spacing which may be used without fear of sagging lath.

Packed 15 sheets—20 square yards to the bundle.
Size sheets—18 x 96 inches—1⅓ square yards.
Size mesh—$\frac{7}{32}$ x 1¼ inches.

	Weight per Sq. Yd.		Studding, Center to Center	
Gauge	Painted	Galvanized	Walls	Ceilings
27	2.53	3.17	16 to 18″	16″
26	2.81	Not made	20″	18″
24	3.79	4.39	22 to 24″	20″-22″-24″
22	4.74	Not made	26 to 28″	26 to 28″

Herringbone Armco Iron Lath

Woolworth Building, New York City
Architect, Cass Gilbert
Herringbone Armco Iron Lath used for Ceilings

New Municipal Building,
Architects, McKim, Meade & White
Herringbone Armco Iron Lath Specified and Used

After years of scientific research, eminent metallurgists agree that the corrosion of iron and steel is in direct proportion to the amount of impurities contained.

In order to furnish a lath to prevent the possibility of corrosion from adverse climatic conditions, the action of patent plasters, electrolysis, etc., Herringbone Lath is made from Armco Iron. This iron is beyond a doubt the purest commercially manufactured. It analyzes 99.84% pure and when desired a bond will be furnished gauranteeing this purity.

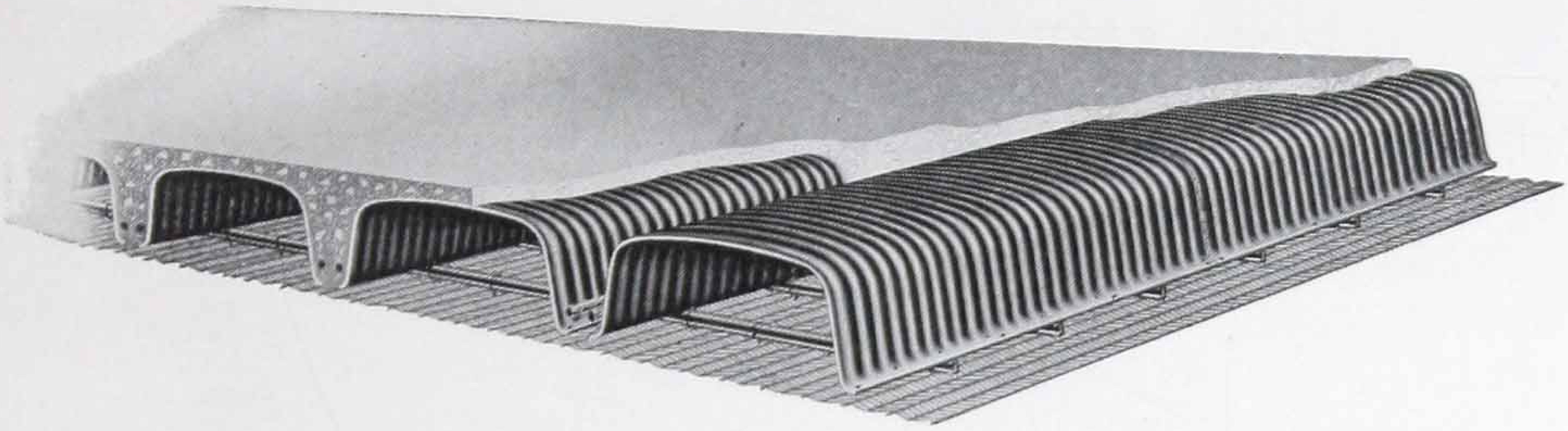
For the purchaser's protection this lath is always coated with a special paint and each bundle is patent sealed and distinctively tagged.

Gauges, Weights per Square Yard, Sizes, Packing, etc., as follows:

Style	Gauge	Size of Sheets	Square Yards per Sheet	Sheets per Bdl.	Weights per Square Yard
"A"	27	13½ x 96"	1	20	3.33
"AAA"	27	18 x 96"	1⅓	15	2.53
"AAA"	26	18 x 96"	1⅓	15	2.81
"AAA"	24	18 x 96"	1⅓	15	3.79
*"AAA"	22	18 x 96"	1⅓	15	4.74
"BB"	27	20¼ x 96"	1½	15	2.25
"BB"	26	20¼ x 96"	1½	15	2.50
"BB"	24	20¼ x 96"	1½	15	3.37
*"BB"	22	20¼ x 96"	1½	15	4.21

*All of above furnished from stock except "AAA"-22 Gauge and "BB"-22 Gauge which are supplied on mill shipment of sheets only.

GF Steel-Tile



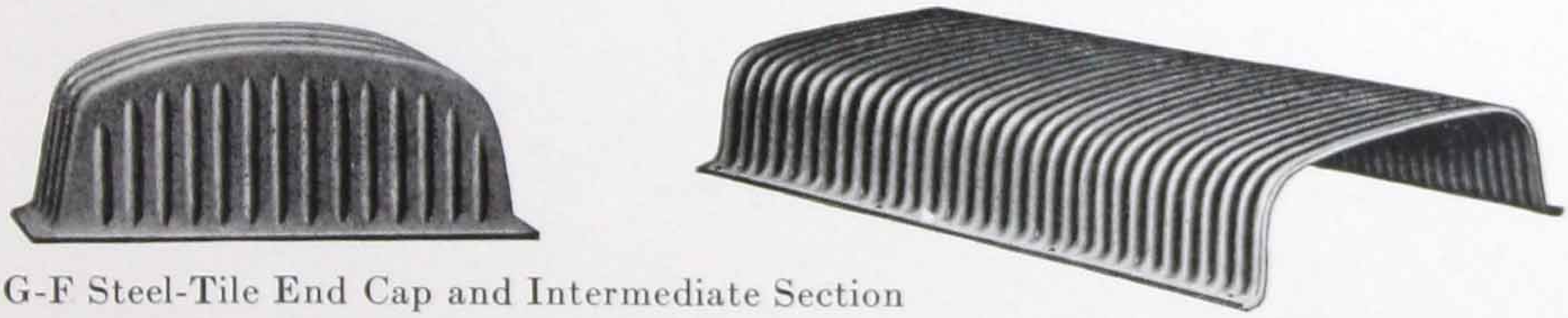
Steel-Tile Floor Construction with GF Channels and Herringbone Rigid Metal Lath for Ceiling

GF Steel-Tile are in reality steel forms for concrete floors designed on the T-beam principle—deep and narrow reinforced joists with a thin slab of concrete between.

The economy of this type of construction, particularly for long span work is very apparent and includes savings throughout the entire structure in which Steel-Tile floors are used. Light weight floors permit lighter beams and girders, columns, foundation and footings.

Savings of material and labor, reduction in amount of form work required, speedy construction—all are secured by the use of GF Steel-Tile.

Ceiling construction with GF channels and Herringbone Rigid Metal Lath is shown at top of page. Ceilings are flat, floors comparatively thin, making story height less without loss of headroom.



G-F Steel-Tile End Cap and Intermediate Section

GF Steel-Tile are made of 26 gauge steel, heavily corrugated, width 20 inches; height 6 inches, 8 inches, 10 inches, 12 inches. Intermediate sections made in 30 inch and 35 inch lengths. End caps furnished to match from 28 gauge steel.

Ask for the Steel-Tile Handbook, complete with tables, formulas and specifications of Steel-Tile Floors and concrete work in general.

GF Waterproofings

CLOSELY allied to almost all construction work is the problem of waterproofing. From an engineering standpoint this problem is sometimes difficult to solve. Realizing that information on "how to waterproof" is of more general benefit to Architects, Contractors and Builders, we have subordinated the materials in the Waterproofing Handbook, to the methods to be employed in securing satisfactory results. We believe, however, that the Waterproofing Handbook will be of such real assistance that the use of GF Waterproofings will follow as a matter of course. A copy on request.

The Handbook, in reality a text book on Waterproofing, contains a method for every condition, and the Line is complete—a material for every need. Briefly, here is what the Line embraces:

GF No. 10 Integral Waterproofing Paste.
GF No. 11 Integral Waterproofing Powder.
GF No. 17 Mop Coating.
GF No. 18 Waterproofing Felt.
GF No. 21 Saturated Fabric.
GF No. 16 Foundation Brush Coating.
GF No. 15 Trowel Coating.
GF No. 200 Dampproofing Coating.
GF No. 99 Acidproofing.
GF No. 100 Colorless Waterproofing.
GF No. 101 Brick and Cement Coating.
GF No. 220 Stainproof Stone Backing.
GF No. 250 Roof and Tile Mastic Cement.
GF No. 140 Concrete Hardener.
GF No. 145 Crystalrox Floor Hardener.
GF No. 150 Floor Primer.
GF No. 151 Floor Coating.
GF No. 300 Shop Coating for Steel.
GF No. 325 Field Coating for Steel.
GF No. 350 Galvanized Iron Coating.
GF No. 400 Bonding Compound.
GF No. 499 Wall Size.
GF No. 500 Interior Wall Coating.

Table No. 13

Volume of Plastic Mortar Made from Different Proportions of Cement and Sand Quantities of Materials Per Cubic Yard

(Reprinted by permission from Taylor & Thompson's "Concrete, Plain and Reinforced," page 230)

Relative proportions by volume*		Volume of Compacted Plastic Mortar						Materials for 1 cu. yd. Compact Plastic Mortar Based on Barrel of					
		From 1 cu. ft. Cemt.			From 1 bbl. Cement								
		Based on Port. Cemt. weighing			Based on barrel of			3.5 cu. ft.		**3.8 cu. ft.†**		4 cu. ft.	
Cement	Sand	108 Lbs. per Cu. Ft.	**100 Lbs. per Cu. Ft.†**	95 Lbs. per Cu. Ft.	3.5 Cu. Ft.	**3.8 Cu. Ft.†**	4 Cu. Ft.	Packed Cement	Loose Sand	**Packed Cement**	**Loose Sand**	Packed Cement	Loose Sand
		cu. ft.	**cu. ft.**	cu. ft.	cu. ft.	**cu. ft.**	cu. ft.	bbl.	cu. yd.	**bbl.**	**cu. yd.**	bbl.	cu. yd.
1	0	0.93	0.86	0.80	3.2	3.2	3.2	8.31		8.31		8.31	
1	½	1.12	1.06	1.02	3.9	4.0	4.1	6.92	0.46	6.73	0.47	6.61	0.49
1	1	1.48	1.42	1.38	5.2	5.4	5.5	5.22	0.68	5.01	0.71	4.88	0.72
1	1½	1.84	1.78	1.74	6.4	6.7	7.0	4.20	0.81	4.00	0.84	3.87	0.86
1	2	2.20	2.14	2.11	7.7	8.1	8.4	3.51	0.91	3.32	0.93	3.21	0.95
1	2½	2.56	2.50	2.47	9.0	9.5	9.9	3.01	0.98	2.84	1.00	2.74	1.01
1	3	2.92	2.86	2.83	10.2	10.9	11.3	2.64	1.03	2.48	1.05	2.39	1.06
1	3½	3.28	3.23	3.19	11.5	12.2	12.8	2.35	1.06	2.20	1.08	2.12	1.10
1	4	3.64	3.59	3.55	12.8	13.6	14.2	2.12	1.10	1.98	1.11	1.90	1.13

Note — Variations in the fineness of the sand and the cement, and in consistency of the mortar may affect the values by 10% in either direction.

*Cement as packed by manufacturer, sand loose. **†Use these columns ordinarily.**

One cubic yard cement plaster covers:

⅝"thick—63 sq. yds. ⅞" thick—45 sq. yds. 1¼"thick—31½ sq. yds. 1¾" thick—22½ sq. yds.
¾" thick—54 sq. yds. 1" thick—36 sq. yds. 1½" thick—27 sq. yds. 2" thick—18 sq. yds.
10% lime added will increase these quantities not more than 5%.

Table No. 14

Cubic Yards Concrete Required for Beams, Columns and Slabs

	Cubic Yards of Concrete for Beams 100 ft. Long									COLUMNS					SLABS		
											Square		Round				
Width DEPTH	4 Inch	5 Inch	6 Inch	7 Inch	8 Inch	9 Inch	10 Inch	11 Inch	12 Inch	Side of Square or Diam. of Round	Cubic Yds. per Ft. Height	Weights per Ft. Height and Area Section	Cubic Yds. per Ft. Height	Weight per Ft. Height and Area Section	Thickness	Cubic Yds. per 100 Sq. Ft.	**Weight per Sq. Ft.**
4"	.412																
5"	.515	.643															
6"	.617	.772	.926							6"	.009	36					
7"	.720	.900	1.080	1.260						7"	.013	49			2"	.6175	**24**
8"	.823	1.029	1.235	1.440	1.646					8"	.016	64			2½"	.7715	**30**
9"	.926	1.157	1.389	1.620	1.852	2.083				9"	.021	81			3"	.926	**36**
10"	1.029	1.286	1.543	1.801	2.058	2.315	2.572			10"	.026	100					
11"	1.132	1.415	1.697	1.981	2.263	2.546	2.829	3.112		11"	.031	121			3½"	1.080	**42**
12"	1.235	1.543	1.852	2.161	2.469	2.778	3.086	3.395	3.704	12"	.037	144	.029	113.1			
13"	1.337	1.672	2.006	2.340	2.675	3.009	3.343	3.677	4.012	13"	.043	169	.034	132.7	4"	1.235	**48**
14"	1.440	1.801	2.161	2.521	2.881	3.241	3.601	3.961	4.321	14"	.050	196	.040	153.9			
15"	1.543	1.929	2.315	2.701	3.086	3.472	3.858	4.244	4.630	15"	.058	225	.045	176.7	4½"	1.389	**54**
16"	1.646	2.058	2.468	2.881	3.292	3.704	4.115	4.526	4.936	16"	.066	256	.052	201.1			
17"	1.749	2.186	2.624	3.061	3.498	3.935	4.373	4.810	5.247	17"	.074	289	.058	227.0	5"	1.543	**60**
18"	1.852	2.315	2.778	3.241	3.704	4.167	4.630	5.093	5.555	18"	.083	324	.065	254.5			
19"	1.955	2.443	2.932	3.421	3.909	4.398	4.887	5.376	5.864	19"	.093	361	.073	283.5	5½"	1.698	**66**
20"	2.058	2.572	3.086	3.601	4.115	4.630	5.144	5.658	6.173	20"	.103	400	.081	314.2			
21"	2.161	2.701	3.240	3.781	4.321	4.861	5.402	5.941	6.482	21"	.113	441	.089	346.4	6"	1.852	**72**
22"	2.263	2.829	3.394	3.961	4.526	5.093	5.659	6.224	6.790	22"	.124	484	.098	380.1			
23"	2.366	2.958	3.549	4.141	4.732	5.324	5.916	6.507	7.099	23"	.136	529	.107	415.5	6½"	2.006	**78**
24"	2.469	3.086	3.704	4.321	4.938	5.555	6.173	6.790	7.408	24"	.148	576	.116	452.4			
25"	2.572	3.215	3.858	4.501	5.143	5.786	6.429	7.072	7.716	25"	.160	625	.126	490.9	7"	2.161	**84**
26"	2.674	3.343	4.012	4.680	5.349	6.018	6.686	7.358	8.023	26"	.174	676	.136	530.9			
27"	2.778	3.472	4.167	4.861	5.556	6.249	6.944	7.638	8.333	27"	.187	729	.147	572.6	7½"	2.315	**90**
28"	2.881	3.601	4.321	5.041	5.761	6.481	7.202	7.922	8.642	28"	.201	784	.158	615.8	8"	2.469	**96**
29"	2.984	3.729	4.475	5.221	5.967	6.713	7.459	8.205	8.951	29"	.216	841	.170	660.5	8½"	2.624	**102**
30"	3.086	3.858	4.630	5.401	6.173	6.944	7.716	8.488	9.259	30"	.231	900	.182	706.9	9"	2.778	**108**
31"	3.189	3.987	4.784	5.581	6.379	7.176	7.974	8.770	9.568	31"	.247	961	.194	754.8	9½"	2.932	**114**
32"	3.292	4.115	4.938	5.761	6.584	7.407	8.230	9.053	9.876	32"	.263	1024	.207	804.2	10"	3.086	**120**
33"	3.395	4.244	5.091	5.941	6.790	7.639	8.487	9.336	10.18	33"	.280	1089	.220	855.3	10½"	3.241	**126**
34"	3.498	4.372	5.248	6.122	6.996	7.870	8.745	9.619	10.49	34"	.292	1156	.233	907.9	11"	3.396	**132**
35"	3.601	4.501	5.401	6.301	7.201	8.101	9.002	9.902	10.80	35"	.315	1225	.247	962.1	11½"	3.550	**138**
36"	3.704	4.630	5.555	6.481	7.407	8.333	9.259	10.19	11.11	36"	.333	1296	.262	1017.9	12"	3.704	**144**

Table No. 16

Quantities of Materials for One Cubic Yard of Rammed Concrete Based on a Barrel of 3.8 Cubic Feet

(Reprinted by permission from Taylor & Thompson's "Concrete, Plain and Reinforced," page 231)

Proportions by Parts			Proportions by Volumes			Volume of Mortar in Terms of Percentage of Volume of Stone	Percentages of Voids in Broken Stone or Gravel														
							50%*			45%†			40%‡			30%§			20%§		
Cement	Sand	Stone	Packed Cement	Loose Sand	Loose Stone		Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone
			bbl.	cu. ft.	cu. ft.		bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.
1	....	1	1	....	3.8	94	5.09	....	0.72	4.90	....	0.69	4.73	....	0.67	4.33	....	0.61	4.02	....	0.57
1	....	2	1	....	7.6	51	3.67	....	1.03	3.48	....	0.98	3.30	....	0.93	2.93	....	0.82	2.65	....	0.75
1	....	3	1	....	11.4	36	....	....	....	2.69	....	1.14	2.54	....	1.07	2.22	....	0.94	1.98	....	0.84
1	....	4	1	....	15.2	29	....	....	....	....	....	....	....	....	....	1.78	....	1.00	1.58	....	0.89
1	....	5	1	....	19.0	25	....	....	....	....	....	....	....	....	....	1.49	....	1.05	1.31	....	0.92
1	....	6	1	....	22.8	22	....	....	....	....	....	....	....	....	....	1.28	....	1.08	1.12	....	0.95
1	....	7	1	....	26.6	20	....	....	....	....	....	....	....	....	....	....	....	....	0.98	....	0.97
1	....	8	1	....	30.4	19	....	....	....	....	....	....	....	....	....	....	....	....	0.87	....	0.98
1	....	9	1	....	34.2	18	....	....	....	....	....	....	....	....	....	....	....	....	0.78	....	0.99
1	....	10	1	....	38.0	17	....	....	....	....	....	....	....	....	....	....	....	....	0.71	....	1.00
1	....	11	1	....	41.8	16	....	....	....	....	....	....	....	....	....	....	....	....	0.65	....	1.01
1	....	12	1	....	45.5	15	....	....	....	....	....	....	....	....	....	....	....	....	0.60	....	1.01
1	1	1½	1	3.8	5.7	99	3.19	0.45	0.67	3.08	0.43	0.65	2.97	0.42	0.63	2.78	0.39	0.59	2.62	0.37	0.55
1	1	2	1	3.8	7.6	75	2.85	0.40	0.80	2.73	0.38	0.77	2.62	0.37	0.74	2.43	0.34	0.68	2.26	0.32	0.64
1	1	2½	1	3.8	9.5	61	2.57	0.36	0.90	2.45	0.34	0.86	2.34	0.33	0.82	2.15	0.30	0.76	1.99	0.28	0.70
1	1	3	1	3.8	11.4	51	2.34	0.33	0.99	2.22	0.31	0.94	2.12	0.30	0.90	1.93	0.27	0.82	1.77	0.25	0.75
1	1½	2	1	5.7	7.6	93	2.49	0.53	0.70	2.40	0.51	0.68	2.31	0.49	0.65	2.16	0.46	0.61	2.03	0.43	0.57
1	1½	2½	1	5.7	9.5	76	2.27	0.48	0.80	2.18	0.46	0.77	2.09	0.44	0.74	1.94	0.41	0.68	1.80	0.38	0.63
1	1½	3	1	5.7	11.4	64	2.09	0.44	0.88	2.00	0.42	0.84	1.91	0.40	0.81	1.76	0.37	0.74	1.63	0.34	0.69
1	1½	3½	1	5.7	13.3	55	1.94	0.41	0.96	1.84	0.39	0.91	1.76	0.37	0.87	1.61	0.34	0.79	1.48	0.31	0.73
1	1½	4	1	5.7	15.2	49	1.80	0.38	1.01	1.71	0.36	0.96	1.63	0.34	0.92	1.48	0.31	0.83	1.36	0.29	0.77
1	1½	4½	1	5.7	17.1	44	1.69	0.36	1.07	1.60	0.34	1.01	1.51	0.32	0.96	1.37	0.29	0.87	1.25	0.26	0.79
1	1½	5	1	5.7	19.0	40	1.59	0.34	1.12	1.50	0.32	1.06	1.42	0.30	1.00	1.28	0.27	0.90	1.17	0.25	0.82
1	2	3	1	7.6	11.4	75	1.89	0.53	0.80	1.81	0.51	0.76	1.74	0.49	0.74	1.61	0.45	0.68	1.50	0.42	0.63
1	2	3½	1	7.6	13.3	65	1.76	0.49	0.87	1.68	0.47	0.83	1.61	0.45	0.79	1.48	0.42	0.73	1.38	0.39	0.68
1	2	4	1	7.6	15.2	57	1.65	0.46	0.93	1.57	0.44	0.88	1.50	0.42	0.84	1.38	0.39	0.78	1.27	0.36	0.72
1	2	4½	1	7.6	17.1	51	1.55	0.44	0.98	1.48	0.42	0.94	1.41	0.40	0.89	1.28	0.36	0.81	1.18	0.33	0.75
1	2	5	1	7.6	19.0	47	1.47	0.41	1.03	1.39	0.39	0.98	1.32	0.37	0.93	1.20	0.34	0.84	1.10	0.31	0.77
1	2	5½	1	7.6	20.9	43	1.39	0.39	1.08	1.31	0.37	1.01	1.25	0.35	0.97	1.13	0.32	0.87	1.03	0.29	0.80
1	2	6	1	7.6	22.8	40	1.32	0.37	1.11	1.25	0.35	1.06	1.18	0.33	1.00	1.06	0.30	0.89	0.97	0.27	0.82
1	2½	3	1	9.5	11.4	87	1.72	0.61	0.73	1.66	0.58	0.70	1.60	0.56	0.68	1.49	0.52	0.63	1.40	0.49	0.59
1	2½	3½	1	9.5	13.3	75	1.62	0.57	0.80	1.55	0.55	0.76	1.49	0.52	0.73	1.38	0.49	0.68	1.29	0.45	0.64
1	2½	4	1	9.5	15.2	66	1.52	0.54	0.86	1.46	0.51	0.82	1.40	0.49	0.79	1.29	0.45	0.73	1.19	0.42	0.67
1	2½	4½	1	9.5	17.1	60	1.44	0.51	0.91	1.37	0.48	0.87	1.31	0.46	0.83	1.20	0.42	0.76	1.11	0.39	0.70
1	2½	5	1	9.5	19.0	54	1.37	0.48	0.96	1.30	0.46	0.92	1.24	0.44	0.87	1.13	0.40	0.80	1.04	0.37	0.73
1	2½	5½	1	9.5	20.9	49	1.30	0.46	1.01	1.23	0.43	0.95	1.17	0.41	0.91	1.07	0.38	0.83	0.98	0.34	0.76
1	2½	6	1	9.5	22.8	46	1.24	0.44	1.05	1.17	0.41	0.99	1.11	0.39	0.94	1.01	0.36	0.85	0.92	0.32	0.78
1	2½	6½	1	9.5	24.7	42	1.18	0.42	1.08	1.12	0.39	1.02	1.06	0.37	0.97	0.96	0.34	0.88	0.88	0.31	0.80
1	2½	7	1	9.5	26.6	40	1.13	0.40	1.11	1.07	0.38	1.05	1.01	0.36	0.99	0.91	0.32	0.90	0.83	0.29	0.82
1	3	4	1	11.4	15.2	76	1.42	0.60	0.80	1.36	0.57	0.77	1.30	0.55	0.73	1.21	0.51	0.68	1.12	0.47	0.63
1	3	4½	1	11.4	17.1	68	1.34	0.57	0.85	1.28	0.54	0.81	1.23	0.52	0.78	1.13	0.48	0.72	1.05	0.44	0.66
1	3	5	1	11.4	19.0	61	1.28	0.54	0.90	1.22	0.52	0.86	1.17	0.49	0.82	1.07	0.45	0.75	0.99	0.42	0.70
1	3	5½	1	11.4	20.9	56	1.22	0.52	0.94	1.16	0.49	0.90	1.11	0.47	0.86	1.01	0.43	0.78	0.93	0.39	0.72
1	3	6	1	11.4	22.8	52	1.16	0.49	0.98	1.11	0.47	0.94	1.05	0.44	0.89	0.96	0.41	0.81	0.88	0.37	0.74
1	3	6½	1	11.4	24.7	48	1.12	0.47	1.02	1.06	0.45	0.97	1.01	0.43	0.92	0.92	0.39	0.84	0.84	0.35	0.77
1	3	7	1	11.4	26.6	45	1.07	0.45	1.05	1.01	0.43	0.99	0.96	0.40	0.95	0.87	0.37	0.86	0.80	0.34	0.79
1	3	7½	1	11.4	28.5	42	1.03	0.44	1.09	0.97	0.41	1.02	0.92	0.39	0.97	0.83	0.35	0.88	0.76	0.32	0.80
1	3	8	1	11.4	30.4	40	0.99	0.42	1.11	0.93	0.39	1.05	0.88	0.37	0.99	0.80	0.34	0.90	0.73	0.31	0.82
1	4	5	1	15.2	19.0	76	1.13	0.64	0.80	1.08	0.61	0.76	1.04	0.59	0.73	0.96	0.54	0.68	0.90	0.51	0.63
1	4	6	1	15.2	22.8	64	1.04	0.59	0.88	0.99	0.56	0.84	0.95	0.54	0.80	0.87	0.49	0.73	0.81	0.46	0.68
1	4	7	1	15.2	26.6	55	0.96	0.54	0.95	0.92	0.52	0.91	0.88	0.50	0.87	0.80	0.45	0.79	0.74	0.42	0.73
1	4	8	1	15.2	30.4	49	0.90	0.51	1.01	0.85	0.48	0.96	0.81	0.46	0.91	0.74	0.42	0.83	0.68	0.38	0.77
1	4	9	1	15.2	34.2	44	0.84	0.47	1.06	0.80	0.45	1.01	0.76	0.43	0.96	0.68	0.38	0.86	0.63	0.35	0.80
1	4	10	1	15.2	38.0	40	0.79	0.44	1.11	0.75	0.42	1.06	0.71	0.40	1.00	0.64	0.36	0.90	0.58	0.33	0.82
1	5	10	1	19.0	38.0	47	0.73	0.52	1.03	0.69	0.49	0.97	0.66	0.46	0.93	0.60	0.42	0.84	0.55	0.39	0.77
1	6	12	1	22.8	45.5	46	0.62	0.52	1.04	0.58	0.49	0.98	0.56	0.47	0.94	0.50	0.42	0.84	0.46	0.39	0.78

Note—Variations in the fineness of the sand and the compacting of the concrete may affect the quantities 10 per cent in either direction.

*Use 50 per cent columns for broken stone screened to uniform size. †Use 45 per cent columns for average conditions and for broken stone with dust screened out. ‡Use 40 per cent columns for gravel or mixed stone and gravel. §Use these columns for scientifically graded mixtures.

TABLE No. 17

Quantities of Materials for One Cubic Yard of Rammed Concrete
Based on a Barrel of 4 Cubic Feet

(Reprinted by permission from Taylor & Thompson's "Concrete, Plain and Reinforced," page 232)

Proportions by Parts			Proportions by Volumes			Volume of Mortar in Terms of Percentage of Volume of Stone	Percentages of Voids in Broken Stone or Gravel														
							50%*			45%†			40%‡			30%§			20%§		
Cement	Sand	Stone	Packed Cement	Loose Sand	Loose Stone		Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone
			bbl.	cu. ft.	cu. ft.		bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.
1	....	1	1	....	4	89	4.99	....	0.74	4.80	....	0.71	4.62	....	0.69	4.23	....	0.63	3.91	....	0.58
1	....	2	1	....	8	49	3.57	....	1.06	3.37	....	1.00	3.20	....	0.95	2.84	....	0.84	2.56	....	0.76
1	....	3	1	....	12	35	....	....	....	2.60	....	1.16	2.45	....	1.09	2.13	....	0.95	1.90	....	0.84
1	....	4	1	....	16	28	....	....	....	....	....	....	....	....	....	1.71	....	1.01	1.51	....	0.89
1	....	5	1	....	20	24	....	....	....	....	....	....	....	....	....	1.43	....	1.06	1.26	....	0.93
1	....	6	1	....	24	22	....	....	....	....	....	....	....	....	....	1.22	....	1.08	1.07	....	0.95
1	....	7	1	....	28	20	....	....	....	....	....	....	....	....	....	....	....	....	0.94	....	0.98
1	....	8	1	....	32	18	....	....	....	....	....	....	....	....	....	....	....	....	0.83	....	0.98
1	....	9	1	....	36	17	....	....	....	....	....	....	....	....	....	....	....	....	0.75	....	1.00
1	....	10	1	....	40	16	....	....	....	....	....	....	....	....	....	....	....	....	0.68	....	1.01
1	....	11	1	....	44	15	....	....	....	....	....	....	....	....	....	....	....	....	0.62	....	1.01
1	....	12	1	....	48	15	....	....	....	....	....	....	....	....	....	....	....	....	0.57	....	1.01
1	1	1½	1	4	6	96	3.08	0.46	0.68	2.97	0.44	0.66	2.87	0.42	0.64	2.69	0.40	0.60	2.53	0.38	0.56
1	1	2	1	4	8	73	2.74	0.41	0.81	2.63	0.39	0.78	2.52	0.37	0.75	2.33	0.34	0.69	2.17	0.32	0.64
1	1	2½	1	4	10	59	2.47	0.37	0.91	2.35	0.35	0.87	2.25	0.33	0.83	2.06	0.31	0.76	1.90	0.28	0.71
1	1	3	1	4	12	50	2.25	0.33	1.00	2.13	0.32	0.95	2.03	0.30	0.90	1.85	0.27	0.82	1.70	0.25	0.76
1	1½	2	1	6	8	92	2.39	0.53	0.71	2.30	0.51	0.68	2.22	0.49	0.66	2.07	0.46	0.61	1.94	0.43	0.58
1	1½	2½	1	6	10	74	2.18	0.48	0.81	2.09	0.46	0.77	2.01	0.45	0.74	1.86	0.41	0.69	1.73	0.38	0.64
1	1½	3	1	6	12	62	2.01	0.45	0.89	1.91	0.42	0.85	1.83	0.41	0.81	1.68	0.37	0.75	1.56	0.35	0.69
1	1½	3½	1	6	14	54	1.86	0.41	0.96	1.77	0.39	0.92	1.68	0.37	0.87	1.54	0.34	0.80	1.42	0.32	0.74
1	1½	4	1	6	16	48	1.73	0.38	1.03	1.64	0.36	0.97	1.56	0.35	0.92	1.42	0.32	0.84	1.30	0.29	0.77
1	1½	4½	1	6	18	43	1.62	0.36	1.08	1.53	0.34	1.02	1.45	0.32	0.97	1.31	0.29	0.87	1.20	0.27	0.80
1	1½	5	1	6	20	39	1.52	0.34	1.13	1.43	0.32	1.06	1.35	0.30	1.00	1.22	0.27	0.90	1.11	0.25	0.82
1	2	3	1	8	12	74	1.81	0.54	0.80	1.74	0.52	0.77	1.67	0.50	0.74	1.54	0.46	0.68	1.44	0.43	0.64
1	2	3½	1	8	14	64	1.69	0.50	0.88	1.61	0.48	0.83	1.54	0.46	0.80	1.42	0.42	0.74	1.31	0.39	0.68
1	2	4	1	8	16	56	1.58	0.47	0.94	1.51	0.45	0.89	1.44	0.43	0.85	1.32	0.39	0.78	1.21	0.36	0.72
1	2	4½	1	8	18	51	1.49	0.44	0.99	1.41	0.42	0.94	1.34	0.40	0.89	1.23	0.36	0.82	1.13	0.34	0.75
1	2	5	1	8	20	46	1.40	0.42	1.04	1.33	0.39	0.98	1.26	0.37	0.93	1.15	0.34	0.85	1.05	0.31	0.78
1	2	5½	1	8	22	42	1.33	0.39	1.08	1.26	0.37	1.03	1.19	0.35	0.97	1.08	0.32	0.88	0.98	0.29	0.80
1	2	6	1	8	24	39	1.26	0.37	1.12	1.19	0.35	1.06	1.13	0.34	1.00	1.02	0.30	0.91	0.93	0.28	0.83
1	2½	3	1	10	12	86	1.65	0.61	0.73	1.59	0.59	0.71	1.53	0.57	0.68	1.42	0.52	0.63	1.33	0.49	0.59
1	2½	3½	1	10	14	75	1.55	0.57	0.80	1.48	0.55	0.77	1.42	0.52	0.74	1.32	0.49	0.68	1.23	0.46	0.64
1	2½	4	1	10	16	66	1.46	0.54	0.87	1.39	0.51	0.82	1.33	0.49	0.79	1.23	0.46	0.73	1.14	0.42	0.68
1	2½	4½	1	10	18	59	1.38	0.51	0.92	1.31	0.48	0.87	1.25	0.46	0.83	1.15	0.43	0.77	1.06	0.39	0.71
1	2½	5	1	10	20	54	1.31	0.48	0.97	1.24	0.46	0.92	1.18	0.44	0.87	1.08	0.40	0.80	0.99	0.37	0.73
1	2½	5½	1	10	22	49	1.24	0.46	1.01	1.18	0.44	0.96	1.12	0.41	0.91	1.02	0.38	0.83	0.93	0.34	0.76
1	2½	6	1	10	24	45	1.18	0.44	1.05	1.12	0.41	1.00	1.06	0.39	0.94	0.96	0.36	0.85	0.88	0.33	0.78
1	2½	6½	1	10	26	42	1.13	0.42	1.09	1.07	0.40	1.03	1.01	0.37	0.97	0.92	0.34	0.89	0.84	0.31	0.81
1	2½	7	1	10	28	39	1.08	0.40	1.12	1.02	0.38	1.06	0.96	0.36	1.00	0.87	0.32	0.90	0.79	0.29	0.82
1	3	4	1	12	16	75	1.35	0.60	0.80	1.30	0.58	0.77	1.25	0.56	0.74	1.15	0.51	0.68	1.08	0.48	0.64
1	3	4½	1	12	18	67	1.28	0.57	0.85	1.23	0.55	0.82	1.18	0.52	0.79	1.08	0.48	0.72	1.01	0.45	0.67
1	3	5	1	12	20	60	1.22	0.54	0.90	1.16	0.52	0.86	1.11	0.49	0.82	1.02	0.45	0.76	0.94	0.42	0.70
1	3	5½	1	12	22	55	1.16	0.52	0.95	1.11	0.49	0.90	1.06	0.47	0.86	0.97	0.42	0.79	0.89	0.40	0.72
1	3	6	1	12	24	50	1.11	0.49	0.99	1.06	0.47	0.94	1.01	0.45	0.90	0.92	0.41	0.82	0.84	0.37	0.75
1	3	6½	1	12	26	48	1.06	0.47	1.02	1.01	0.45	0.97	0.96	0.43	0.92	0.87	0.39	0.84	0.80	0.36	0.77
1	3	7	1	12	28	44	1.02	0.45	1.06	0.97	0.43	1.01	0.92	0.41	0.95	0.83	0.37	0.86	0.76	0.34	0.79
1	3	7½	1	12	30	42	0.98	0.44	1.09	0.93	0.41	1.03	0.88	0.39	0.98	0.79	0.35	0.88	0.73	0.32	0.81
1	3	8	1	12	32	39	0.94	0.42	1.11	0.89	0.40	1.05	0.84	0.37	1.00	0.76	0.34	0.90	0.69	0.31	0.82
1	4	5	1	16	20	75	1.08	0.64	0.80	1.03	0.61	0.76	0.99	0.59	0.73	0.92	0.55	0.68	0.86	0.51	0.64
1	4	6	1	16	24	63	0.99	0.59	0.88	0.95	0.56	0.84	0.91	0.54	0.81	0.83	0.49	0.74	0.77	0.46	0.68
1	4	7	1	16	28	55	0.92	0.54	0.95	0.88	0.52	0.91	0.83	0.49	0.86	0.76	0.45	0.79	0.70	0.42	0.73
1	4	8	1	16	32	48	0.86	0.51	1.02	0.81	0.48	0.96	0.77	0.46	0.91	0.70	0.42	0.83	0.64	0.38	0.76
1	4	9	1	16	36	43	0.80	0.47	1.07	0.76	0.45	1.01	0.72	0.43	0.96	0.65	0.39	0.87	0.60	0.36	0.80
1	4	10	1	16	40	40	0.75	0.44	1.11	0.71	0.42	1.05	0.67	0.40	0.99	0.61	0.36	0.90	0.55	0.33	0.81
1	5	10	1	20	40	47	0.70	0.52	1.04	0.66	0.49	0.98	0.63	0.47	0.93	0.57	0.42	0.84	0.52	0.38	0.77
1	6	12	1	24	48	46	0.59	0.52	1.05	0.56	0.50	1.00	0.53	0.47	0.94	0.48	0.43	0.85	0.44	0.39	0.78

Note—Variations in the fineness of the sand and the compacting of the concrete may affect the quantities by 10 per cent in either direction.

*Use 50 per cent columns for broken stone screened to uniform size. †Use 45 per cent columns for average conditions and for broken stone with dust screened out. ‡Use 40 per cent columns for gravel for mixed stone and gravel. §Use these columns for scientifically graded mixtures.

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